

HEALTH HABITS

REVISED EDITION



O'SHEA and KELLOGG
HEALTH SERIES
of
PHYSIOLOGY and HYGIENE

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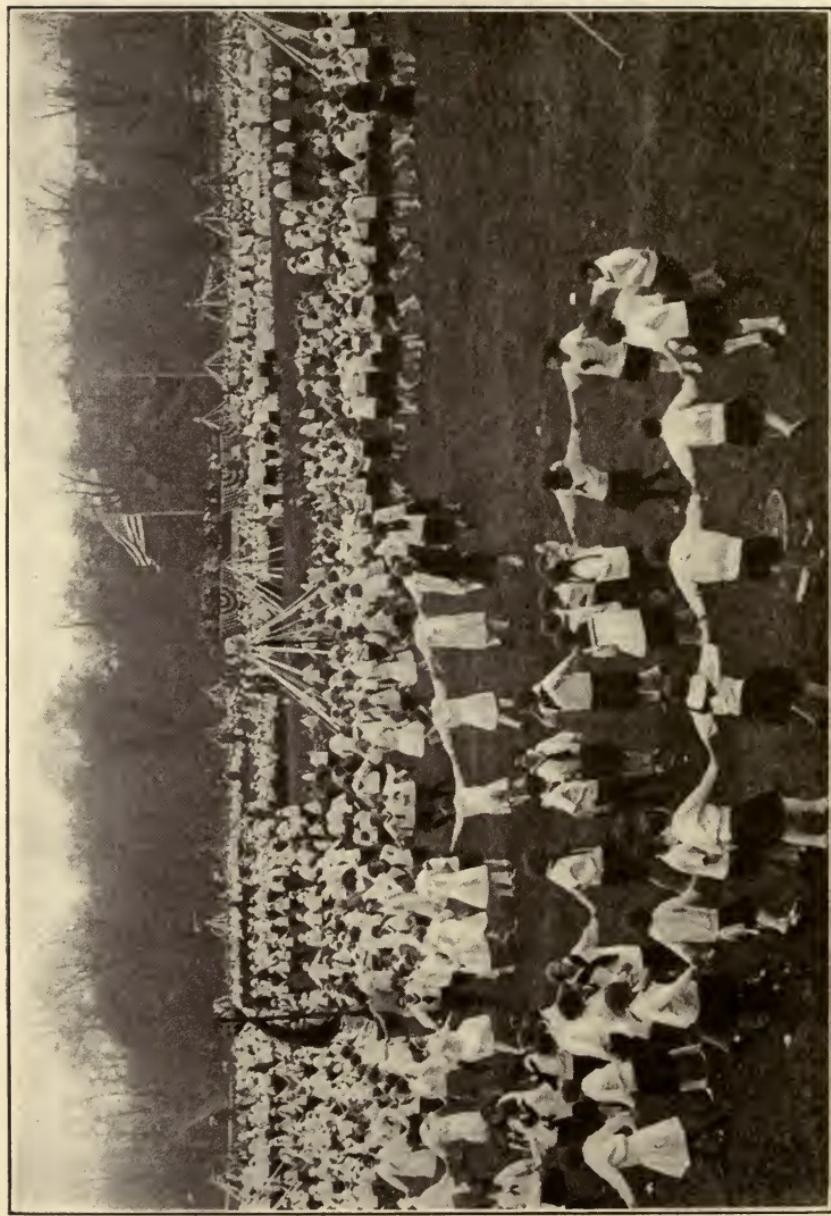
HEALTH HABITS

THE HEALTH SERIES
OF
PHYSIOLOGY AND HYGIENE

HEALTH HABITS
HEALTH AND CLEANLINESS
THE BODY IN HEALTH
HEALTH AND EFFICIENCY



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PEOPLE WHO ARE WELL GET MUCH MORE OUT OF LIFE THAN THOSE WHO ARE SICK.

HEALTH HABITS

REVISED EDITION

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PREFACE

THIS first book of the Health Series of Physiology and Hygiene is suitable for children in the intermediate grades of the elementary school. The purpose of the book is, first, to lead young pupils to see that their habits of living determine whether they will be sick or well much of the time and whether or not they will have strength to do the various things which they want to accomplish; and, second, to show pupils how to arrange their program of daily life so that they can have good feeling and be fit at all times for play or work. Good health is made so attractive in this book that a child would rather follow rules for attaining health than to continue unhealthful habits.

In the preparation of the book, the authors have studied the typical child from nine to twelve years of age in his daily life. They have noted his tendencies in matters involving health, and they have studied particularly his problems in adapting himself to present-day conditions in the country and in the city. These observations have suggested the subjects pertaining to health which will interest a child and which will be of practical value for him in everyday life. These are the subjects which are discussed in this book.

The authors have further studied children in respect to their attitude toward different methods of presenting facts of health with a view to determining healthful habits.

They have found that the typical child is not much influenced by mere exhortation to live in a healthful way; but he is deeply influenced by everything which promises to increase his energy for his games and plays and which will help him to avoid pains and sickness that not only cause distress but also deprive him of the opportunities he craves to be in action all the time and to succeed as well as his rivals in all his undertakings. These traits of children have determined the manner in which the facts and principles in this book have been treated.

The aim throughout has been (1) to use the simplest and most concrete terms; (2) to develop the meaning for any new term before it is given; (3) to illustrate every principle of health by familiar examples and by photographs and drawings; (4) to have the young become self-helpful in solving problems and projects relating to health; and (5) to assist the pupil to keep the points being discussed in mind by the use of marginal headings. List of questions have been appended to each chapter for the use of both the pupil and the teacher.

In the first edition of this book there was a Glossary in which unusual or technical terms were defined. While this feature has been generally copied in the books on hygiene published since this volume appeared, still experience has shown that it will be more serviceable to pupils and teachers to include the Glossary in the Index, which is done in the present volume. Special pains have been taken to develop concretely the meaning of each unusual or technical term before it is used in the text. The best way for a pupil or a teacher to learn the exact meaning of any term is to note *how it is used*. A mere definition of an unusual or technical

term in a glossary usually leaves much to be desired; so the authors of this book determined, when it was decided to prepare a revised edition, that unusual or technical terms would be employed only when absolutely necessary to describe an organ, a bodily function, or a health habit clearly and effectively, and whenever such a term was used its meaning should first be made clear and precise by concrete description and illustration. The authors further found upon investigation that it would be more convenient for pupil and teacher to have all unusual or technical terms presented in their proper place in an alphabetical index than to have a separate glossary, which in reality means another index. It is believed that the plan adopted in the revised edition will prove most satisfactory from every viewpoint.

THE AUTHORS.

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HEALTH HABITS

CHAPTER I

WHAT GOOD HEALTH MEANS

WHEN a person is in good health, his whole body is in fine working order. He feels no pains, aches, lameness, or laziness. He feels full of life and vigor. When one does not have good health, the trouble is generally due to lack of proper care of the body, either on the person's own part or on the part of some one else.

The rose gardener who every week in the warm weather loosens the soil about his plants, waters them, weeds them, and keeps them free from insects will have larger and more beautiful blossoms than if he simply left the roses to do the best they could without any care. His bushes will become so strong and hardy that they can endure the frost and the cold when the winter season comes around. But if they are neglected, they will soon die.

Just as with the gardener's rosebushes, so with people; anyone who takes pains to give his body the right kind of care every day can be strong and hardy. With good health, the body is so full of life and force that it

HEALTH HABITS

can resist disease, as the strong rose plant can resist the frost.

It pays to have good health. The person who has excellent health will rarely suffer with headache, toothache, earache, boils, coughs, colds, and other ills.

When a boy has something the matter with him every now and then, he misses many pleasures and falls behind in his work. Think of two persons you know, one of whom has poor health (that is, he has pains or aches of some kind quite frequently, or he cannot eat or sleep well) and the other has good health. Surely you will find that the latter gets more out of life than the former. He can accomplish more with his



GOOD HEALTH AND GOOD FEELING
GO TOGETHER.

mind and his body. He can do his work with greater ease. He can earn more money. He will probably live longer. He will be more cheerful and happy. He can therefore give more pleasure and be more useful to the people around him, and he will be better liked by them.

How many of those you know have good health? I once asked eight hundred young women, students in a

college: "How many of you feel well all the time?" Only a few were found who did not have some kind of ache or pain almost every day. What do you think about the health habits of people who feel unwell much of the time?

Good
health is
possible

Some persons have good health much of the time. Many of us have only a fair average. Ought not every-



WHICH MARY WOULD YOU RATHER BE?

one to aim for a 100% mark in health as well as in other things? It is quite possible to live so as to keep one's health sound. When Mr. Roosevelt was President, he asked Professor Irving Fisher of Yale University to find out how many people in the United States were sick from diseases that might have been prevented. Professor Fisher found that there were *three*

HEALTH HABITS

million people in the United States sick all the time and that one half of this number (1,500,000) need not have become ill if they, or some one else, had not carelessly broken the laws of health.

Henry's father made him a present of a fine new bicycle. Its wheels spun around like a top. It did ^{Health, the} not rattle or creak. So long as Henry took ^{valuable} good care of his bicycle, it looked new and ^{gift} fine and was always ready to give him a good time when he rode it. By and by he began to neglect



"MY BICYCLE HELPS ME TO KEEP FEELING FINE."

his bicycle. He forgot to clean and oil it. It became rusty and dirty. It rattled as it ran. Its wheels turned so hard that it was no longer any pleasure for Henry to ride it.

Our bodies are in some ways like bicycles. With good care they serve us well and are so full of vigor that work is a pleasure and it is not hard to do our best in whatever we undertake.

If some one gave you a valuable gift, would you



IT PAYS TO HAVE GOOD HEALTH.

treat it carelessly and spoil it as Henry did his bicycle? Or would you take good care of it and keep it sound as long as possible? Do you not think everyone ought to take such care of his body that it will always be in good working condition?

HEALTH HABITS

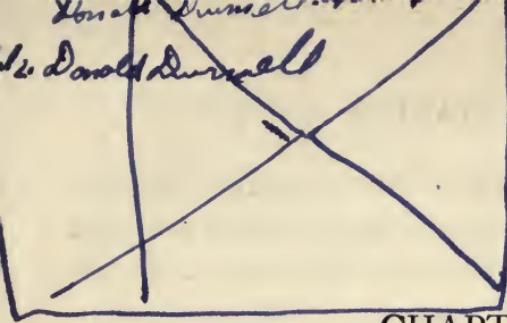
REMEMBER: It is not the weak and the sickly persons who win the race or who have the best time or who do the most things that are worth while.

HEALTH PROBLEMS AND PROJECTS

1. Think over what you did during the last summer vacation. Count up the number of days on which no pain or ache interfered with your work or pleasure.
2. Can you tell *why* you were in good health on those days?
3. Looking forward to next summer, would you like to have some "off" days mixed in with the others? Why not? Give all the reasons you can.
4. Look at the picture of strong boys on page 5. Would you rather look like them or be more delicate looking? Why?

REVIEW QUESTIONS

1. How does good health make one feel?
2. What will good care do for the body?
3. Will it pay one to keep in good health? In what ways will it pay?
4. What loss does bad health cause?
5. Do most persons seem to have good health?
6. Why are so many people sick much of the time?



CHAPTER II

HEALTH HABITS YIELD STRENGTH AND PLEASURE

OF course you have often watched the building of houses. Have you noticed that the foundations are usually made of many separate blocks of cement or stone well fitted together? Have you ever thought that if some of these blocks were left out in places here and there or were carelessly laid in, the foundation would be so weakened that the house would be in constant danger of falling down?

The foun-
dations of
health

One's habits of living are the foundation of good or poor health. Like the well-placed stones in the wall, right habits strengthen and harden the body, while wrong habits weaken it and break it down. Even a single bad habit may keep one in poor health much of the time.

Ten-year-old Bertha loved to read stories. Nearly every night she took papers and books to bed with her and read for a long time, often for hours after everyone else in the house was asleep. Her mother, who knew nothing of this bad habit, awoke her at five o'clock each morning. Thus Bertha, who needed nine hours' sleep each night to keep herself in good health, often slept no more than five hours. After a time

HEALTH HABITS

she began to grow thin, to lose her appetite, to have a pain in the back of her head, and to feel irritable and unhappy. Instead of being a help she now became a care to her mother and an extra expense to her father. Besides, the people around her grew to dislike her because she was peevish and disagreeable.

Health habits have to do with just such everyday matters as sleeping, breathing, eating, drinking, and so on. They have to do also with the way we sit, stand, and move about; with our clothing, our exercise, and the way we treat the skin, the hands, the teeth, the eyes, and other organs.

We form a habit by doing a thing over and over until it can be done without our having to think about **Forming** it. What has been done once is done more **habits** easily the second time and still more easily each time following. If one starts right, it is quite as easy to form a habit which will count on the side of health as to form one which will count against it.

To form a habit, one must practice an action until he does it without thinking about it. Doing the right thing one day and omitting to do it the next day is indeed a bad way to live. If a boy every now and then drops a ball of string he is winding, so much string unwinds that he may never get it wound up. So it is with forming habits that will make the body strong, hardy, and well. We must not forget health habits until we have so fixed them that they will work whether we think of them or not.

It is important too that we start to form good health habits while young. The earlier we begin, the stronger and more powerful the habits will become as we grow in years. If one starts a stone rolling down a hill, it will be harder and harder to stop the farther it gets



WHAT WILL HAPPEN IF YOU DROP A GOOD HABIT BEFORE IT IS WELL FIXED?

from the starting point. So it is with a good habit. Is it any different, do you think, with a bad habit?

Roland and Ruth lived with their parents in a beautiful country home around which grew many fine trees. The children loved to play in the shade of these trees during the summer time. In the winter when the leafless branches were covered with icicles or tufts of snow, they thought no fairyland was ever quite so lovely.

Being wide-awake children, they had noticed with regret that while most of the trees were straight and graceful, two trees, a rather large one and a smaller one, were so bent that they were ugly. The children were delighted one morning when they

Correcting a habit saw some men preparing to straighten the trees. The men drove strong stakes on one side of the smaller tree in such a way that they could use the stakes to pull it up straight. After much hard work they were able to bring the tree up nearly straight, and then they braced it so that it could not fall back



IT IS HARD TO CHANGE FIXED HABITS.

into its old shape. They tried the same plan with the larger tree; but although they worked over it with all their might in every way they knew how, the tree would not yield.

It is much the same with a person who has formed a good or a bad habit. When he has grown accustomed

to doing anything either right or wrong, it is about as hard for him to change as it is for an old crooked tree to become straight. At first the crooked tree was as straight as any of the others, but something bent it just a little, and every time the wind blew, it bent it a little more until it became very crooked. If, when it was young, an attempt had been made to straighten it, this could have been done easily.

You should notice too that strong, straight trees cannot be bent when they are grown. They have always kept themselves straight, and their habit of straightness is so firmly fixed that they will always remain so. "As straight as a pine" is a fine old saying.

REMEMBER: When a boy or a girl forms any habit, whether it be a good or a bad one, it is very hard ever to change it. *It is easy to change the course of a small stream, but it is not easy when the stream has become a great river.*



HEALTH HABITS

HEALTH PROBLEMS AND PROJECTS

1. Describe five acts you can perform without thinking about them while performing them. Why are you able to do them so easily?
2. Describe a habit of your dog or kitten that counts for its health. One that counts against its health.
3. Describe three habits in any person you know (but you need not give the person's name) that count for health. Also three habits that count against health.
4. Do you know of anyone who occasionally does something he would rather not do? Why does he do it?
5. Do one's habits depend somewhat on the kind of companions one chooses? Why?

REVIEW QUESTIONS

1. What are the foundations of good health?
2. Mention some matters with which health habits have to do.
3. How does one form a habit?
4. How can one keep from forming a particular habit?
5. When should one begin to form health habits?
6. Is it hard to break a bad habit? Why?
7. Is it as hard to change good habits as bad ones?



CHAPTER III

HEALTH HABITS IN STANDING

WHAT do you think it is that makes such a difference in the appearance of these two boys? Notice that John stands **Habits in** squarely **standing** on both feet. He seems to keep his body erect without trying. He holds his head up and his chest out. Both his shoulders are on the same level. At times he enjoys expanding his chest as far as he can with long, deep breaths. His strong, fine carriage makes him look full of vigor and ready for any game or any task. When I look at



WHICH BOY WOULD YOU WISH TO COPY?

HEALTH HABITS

him, I feel sure that he is the kind of boy who will do with all his might and with pleasure whatever he has to do. Notice how easily and naturally he holds himself in this good position. How is he able to keep it without an effort?

Alfred stoops as he stands. His head droops forward. His back curves outward, and his chest inward. One would almost think his chest was behind instead of in front of him. He walks with a careless, shambling gait. He lacks the "ready-for-business" air which John has.

If the two boys were seeking a job, which would stand the better chance of securing it? Do you think John's bearing makes him appear more *manly* than Alfred? Do you think he could play a better game or work harder without getting tired? Why? If they should have a contest of good looks, who would win the prize? The way one holds his body has much to do with his health as well as with his appearance.

At a factory where watches are made, one may see timepieces in great variety. The case of each watch is made exactly the right size and shape to hold the body's working parts, or machinery. To each machinery part is allowed just enough space for its own movement. All the parts working together move the hands around the dial. If by some accident the case of a watch should become indented or bent, it might so decrease the working space of some of the wheels that they could not turn easily or could run only part

Cramping made exactly the right size and shape to hold the body's working parts, or machinery. To each machinery part is allowed just enough space for its own movement. All the parts working together move the hands around the dial. If by some accident the case of a watch should become indented or bent, it might so decrease the working space of some of the wheels that they could not turn easily or could run only part

way around. As a result, the whole machinery would be put out of order, and the watch would no longer keep good time or probably would stop altogether.

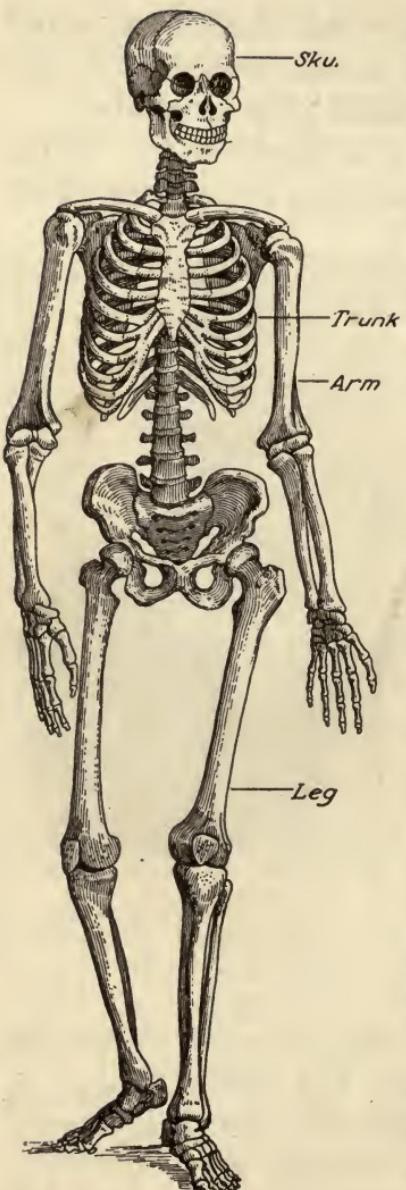
The body resembles a watch in some ways. Within its frame are many delicate working parts with which we breathe, digest our food, and perform other acts which keep us alive and well and enable us to play, to work, and to enjoy living. Whether the body be that of a baby or of a grown man, nature has provided it with just enough room for each of these vital parts to do its work properly when the body maintains the correct position. If we fall into a bad position, with stooping shoulders and a flat chest (like dents in a watchcase), then these vital parts may become so crowded that it will be impossible for them to work well, and the whole body will suffer as a result.

When you take hold of your arm lightly, it feels soft. But if you press upon it, you then feel something hard inside. The soft portion we call *flesh*; the hard substance within is *bone*. The



SUPPOSE YOU SHOULD BEND THE CASE
IN ON THE WORKS: WHAT WOULD
HAPPEN TO THE WATCH?

The frame-
work of
the body



THE HUMAN SKELETON.

framework, or *skeleton*, as it is called, by which the whole body is supported is made up of bones and two other kinds of materials — *cartilage* and *ligaments*. *Cartilage* is another name for *gristle*, a tough substance which you have probably seen in meat. You can feel the difference between bone and cartilage in the upper and the lower part of your nose. *Ligaments* are tough cords, or bands, which hold the separate bones together. These also you may have found in meat. The skeleton is composed not of one but of a great many bones — in all, just two hundred six in number. The points at which bones are joined together are called *joints*.

The skeleton has four divisions, the skull (the bones of the head), the trunk, the arms, and the legs. The trunk forms a bony case to

contain and protect some of the most important parts of the body. These parts are called *organs*, as is each other part of the body which does a special work.

The bones are the hardest parts of the body. When a person is full grown, the bones are very firm and stiff,



BOWLEGS CAN BE AVOIDED.
How?



THIS BOY WAS NOT PERMITTED TO
STAND OR WALK TOO EARLY.

but in the young child they consist mostly of cartilage. Cartilage is more yielding, which makes it possible for young bones to bend easily.

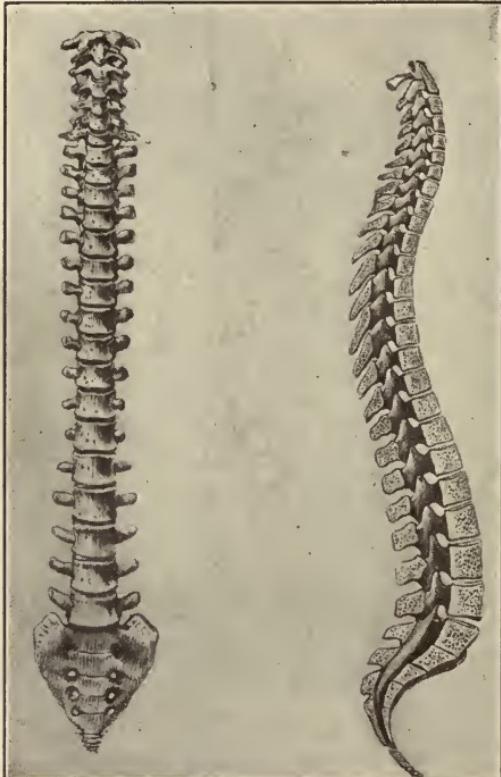
People often injure a baby by trying to make it sit alone or stand before its bones have become firm enough to support the weight of its body. Bowlegs are often

caused by making a child walk while the bones in the legs are still soft.

From year to year as the child grows, the cartilage hardens to bone until, when growth is com-

Habits complete, the shaping skeleton is the frame- mostly firm work bone. If

bad posture becomes a habit with growing boys and girls, the bones as they harden will become misshapen and deformed. Such boys and girls may have to go through life with crooked bones. Do you know any crooked men or women, people with stooped shoulders, with one shoulder higher than the other,



FRONT AND SIDE VIEW OF THE SPINAL COLUMN,
OR BACKBONE.

with bowlegs, or with other deformities?

There is in the skeleton a long bony column upon which the head is carried. This is called the *spinal column*, or *backbone*. It is not a single bone but is

made up of a row of separate, oddly shaped bones arranged one above the other, with cushions of cartilage between. These bones are so nicely connected that the spinal column can be made to bend with ease in any direction that the movements of the body make necessary.

Because it can be bent so easily, the spinal column is often made to bend when it should not or to bend in a wrong way so often that it becomes crooked. Keeping the weight in standing always on the same leg, standing with the body bent forward when at work or play, sleeping with the head

raised high upon thick pillows are ways through which children often grow out of shape. The backbones of girls who take care of babies often become curved, because they carry the children on one arm much more than on the other. Do you use the same arm every day to carry a heavy load of books to and from school? If you do, what may be the result of this on your own spinal column? Doing so a few times will result in no



X-RAY VIEW OF A CROOKED SPINE CAUSED BY
BAD POSTURE.

HEALTH HABITS

injury. But when the strain from a wrong posture becomes an everyday occurrence, lasting hours at a time, or when it is often repeated for even a short time each day, then the soft young bones may yield, and deformity may result.



GETTING CORRECT POSTURE BY STANDING
AGAINST THE WALL.

The boy or girl who wants to take the right standing posture may try this plan:

Learning how to stand correctly

Stand against a wall or a door with the heels, hips, fingers, and back of the head touching the wall. Now roll the head backward so that you can look directly up at the ceiling, letting the chest rise forward but keeping the fingers, hips, and heels hard against the wall.

Draw the chin downward and inward, moving the head without changing the position of the chest and shoulders, till you look directly forward. You are now nicely

balanced on the balls of the feet, and you have the poise which, with slight changes, one should keep when standing or walking.

Note how you feel when you are standing in a correct position. Observe that the chest is held well up, while the abdomen is drawn in.

If a person must stand for a long time in one place, he may put most of the weight first on one leg and then on the other, thus supporting the body with one leg while the other is at rest. He should be careful to keep a correct poise, instead of allowing the body to take a bad posture. He should make frequent changes, letting one leg relieve the other. If he has to carry heavy things, he should make each arm do its share of the work.

In standing, the weight of the body should rest on the balls of the feet and not on the heels; the toes should be turned slightly outward. The arms should hang easily at the sides, and



"I CAN STAND THIS WAY FOR A LONG TIME WITHOUT BECOMING TIRED."



THIS IS ONE WAY TO GET A CROOKED SPINE.

HEALTH HABITS

the body should be held up straight to its full height. The shoulders should be held on the same level. The chest should be high, and the chin drawn in slightly.

No matter what you may have to do, try to keep in the *upright* attitude. If you stand on the street talking to a friend or if you stand for recitation in the schoolroom, try to have the feeling of being *erect*.

You will soon get yourself so used to sitting and standing erect that you will establish this health habit, and then constant attention to it will be unnecessary; but you will have to give careful thought to the matter for a long time.

One day many years ago I was walking along the bank of the Nile



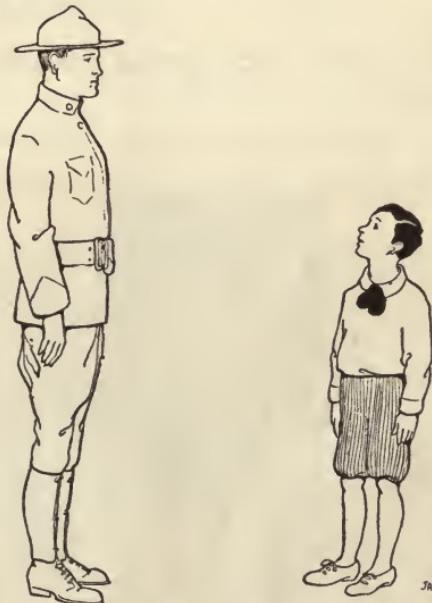
HINDU GIRLS DEVELOPING ERECT POSTURE BY CARRYING OBJECTS UPON THEIR HEADS.

near Cairo, Egypt. Close by were two little girls playing beside the mud-walled hut in which they lived. Although they were very poor, they seemed healthy and

happy. I noticed that one carried on her head a small piece of wood, the other a tin plate. Both were very anxious that the object carried should not fall off. I thought perhaps their mother required them to do this for punishment; but my guide told me she had them do it to train them to walk erect so that they might be able to carry burdens upon their heads. In many countries people often carry heavy objects upon their heads even for long distances. Such people have erect figures.

Carrying a book balanced on the head is a good way for a person to learn to stand straight and to walk erect.

REMEMBER: If anyone wishes to have a straight, strong body, he must, while he is young, acquire the habit of carrying himself easily erect.



NOTICE HOW THE SOLDIER STANDS. DOES THIS POSITION MAKE HIM LOOK BRAVE AND STRONG? WHY?

HEALTH PROBLEMS AND PROJECTS

1. Pick out some one of about your own age who has a very good posture when standing. Describe the way he carries his shoulders, head, and chest.

2. Try to see for how many seconds you can continue drawing in your breath when you are standing erect. Try this again when your chest is contracted, as is that of the boy on the right in the picture on page 13.

REVIEW QUESTIONS

1. What is meant by *flesh*, *bone*, *skeleton*, *cartilage*, *ligament*, *joint*?
2. What are the four divisions of the skeleton?



WHICH OF THESE TWO POSITIONS IS THE BETTER FOR HEALTH? WHY?

3. What happens to the parts inside the body when one maintains a bad position?
4. If a person falls into the habit of keeping a crooked position, what happens to him by the time he is full-grown?
5. What is the *backbone*, or *spinal column*?
6. How do people get crooked backbones?

CHAPTER IV

HEALTH HABITS IN SITTING

If you were to make a visit to the home of some of the Fiji Island children, you would find no chairs, for



JAPANESE CHILDREN SIT ERECT.

when tired they rest by lying full length upon a mat or upon the ground. The Arab boy sits upon the ground and crosses his legs in front of him, holding his body

erect. It is the same way with the boys and girls in Japan, India, and many other Eastern lands. Only people of certain countries use raised seats or chairs.

When civilized people began to make furniture to sit on, they first used stools for seats. But it did not take them long to find out that their bodies became



"I BECOME TIRED IN A SHORT TIME WHEN
I SIT IN THIS CHAIR. IT IS TOO HIGH
AND THE BACK IS NOT RIGHT."



WHAT WILL HAPPEN TO THIS BOY IF HE
ALWAYS SITS BENT FORWARD?

tired unless they had something to lean against. So they put a back to the stool, and it became a chair.

A bad sitting position Frequently one sits in a chair so carelessly that his head droops forward and his chest becomes flattened and so cramped that he cannot breathe deeply and fully. Consequently he does

not breathe enough air to make him feel well and to give him liveliness and vigor. He often becomes dull. Besides, his stomach and other vital organs are forced out of place and are hindered in their work.

It is quite as necessary to hold the body in an erect position when sitting as when standing, for, as we have already seen, the organs within the trunk of the body have just the right amount of room in which to do their work well when the body is held erect. When a person spends much of his time in a bent-over, doubled-up position, these organs are likely to get crowded out of place; they must then do their work in such cramped quarters that it cannot be well done, and their owner feels tired and distressed. Bending the body in exercise does no harm and usually does good; but if the bent position becomes a habit, the parts which hold the organs in place within the trunk become so stretched and weakened that the body may be injured greatly and serious disease may result. The bones also may become misshapen from the bad posture.

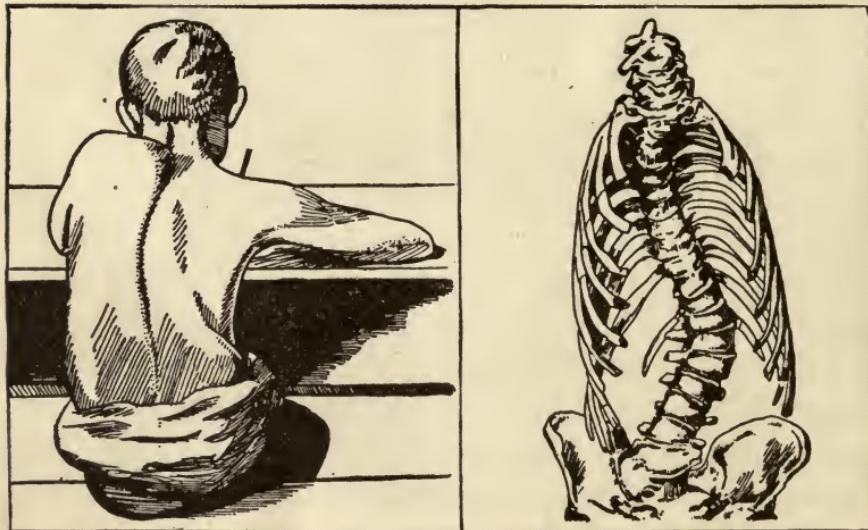
Many boys and girls have ugly curves in their backbones caused by sitting at a high desk with one elbow on the desk. This raises one shoulder so high that the spine becomes crooked.

If a young person sits much of the time with the body bent forward, he will after a while become round-shouldered and flat-chested. Why?

A correct sitting position requires a seat of such a height that the feet can rest easily upon the floor and

of such a width that both hips may touch the back of the chair. A seat that is too low will cramp the legs.

The right kind of chair If the seat is too high, the feet cannot reach the floor and so cannot assist in supporting the body. Besides, the pressure on the nerves of the under part of the legs may cause them to become numb ("to go to sleep," as we sometimes say). More-



A BAD POSTURE IN STUDYING, AND THE RESULT.

over, the body will slip down in the seat, and the back will be bent. This is a bad position. Look at the pictures and you will see for yourself. Why, then, should not all chairs and seats be made to fit the height of the persons who are to use them?

To get a good sitting position, try this plan: Seat yourself with the hips touching the back of the chair.

Place the hands upon the hips with the thumbs on the back as far as possible. Look toward the ceiling, carrying the head back until you are looking straight up. Press the thumbs as hard as you can upon the back, and draw down the chin. You will then have a good position. It will be



IF ONE IS INCLINED TO SIT IN A STOOPING POSTURE, HE CAN SECURE THE PROPER SITTING POSTURE IN THE MANNER SHOWN IN THIS PICTURE. HE SHOULD THEN TAKE THE POSITION SHOWN IN THE NEXT PICTURE.



HERE IS THE CORRECT SITTING POSTURE. NOTE HOW EASILY THE BOY KEEPS HIS SHOULDERS AGAINST THE BACK OF THE CHAIR AND HIS CHEST WELL FORWARD. IT IS "SECOND NATURE" WITH HIM NOW.

worth your while to practice this occasionally. Perhaps if you ask your teacher, she will have all the pupils do this once in a while for relief and exercise.

To keep the right sitting position, the chest must be held high. If the hips and shoulders touch the back of the chair as they ought to do, the center of the spine will of necessity curve forward. When one sits in a chair with a straight back, he will find it tiresome to



AFTER ONE HAS BEEN SITTING FOR A WHILE, IT IS A GOOD THING TO TAKE STRETCHING AND BENDING EXERCISES.

keep the correct posture without using a pad or cushion fastened to the chair to support the back. It is better that the chair be made to fit the back when in proper position.

When one must work for several hours at a task re-

quiring him to sit, it is important that he change his position frequently. Occasionally he should stand or move about for a few minutes to relax his muscles.

Here is a bit of verse for you to learn that may help you to sit and walk correctly:

*Sit with chest held well to fore,
Feet placed square upon the floor,
And do not let your body slump;
'Twill give your spine an ugly hump.
Stand head erect, with lowered chin,
Hips held back and stomach in.
Look the world straight in the face
And walk upright with manly grace.*

REMEMBER: It will pay in good health, comfort, and efficiency to acquire the habit of sitting up straight and holding the chest high without effort.

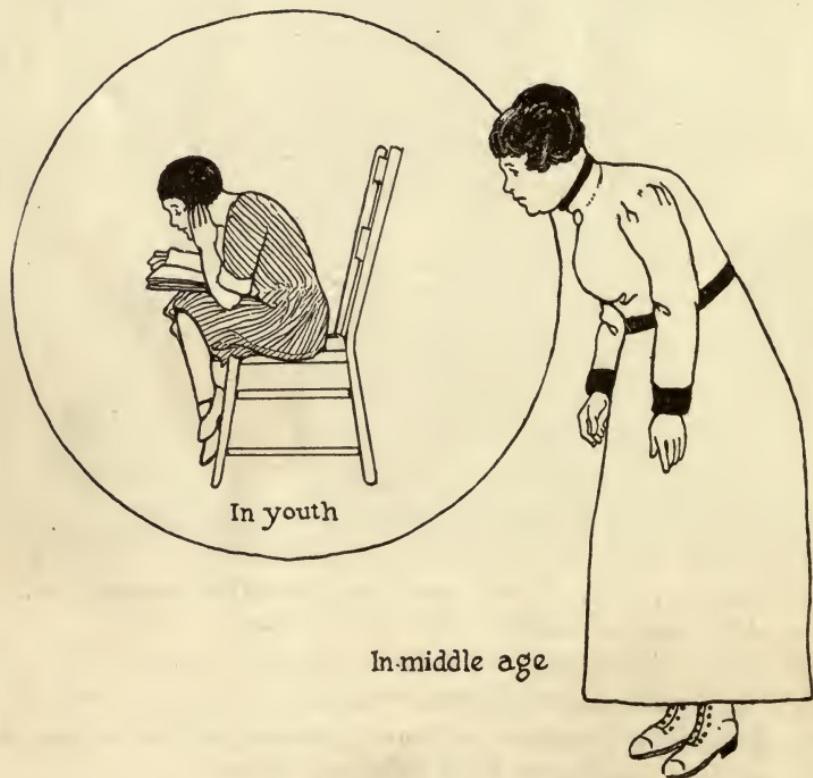
HEALTH PROBLEMS AND PROJECTS

1. Try this: While sitting, bend forward as far as you can conveniently, and see how deeply you can breathe. Then sit erect, and see whether you can breathe more deeply. Explain.
2. Do the pupils in your room keep their feet squarely on the floor when they are seated? If not, why not?
3. Are there children of different heights in your home? If so, do they use chairs of different sizes?
4. Notice the positions of your classmates at their seats. Do they sit erect, or do they bend over their desks?
5. Describe the position of a person sitting incorrectly in a rocking chair, mentioning his shoulders, his head, his chest, and so on.

HEALTH HABITS

REVIEW QUESTIONS

1. What bad positions are we liable to get into when sitting, reading, or sewing?
2. Is it as necessary to have good posture in sitting as in standing? Why?
3. How is one likely to feel when he has a bad posture in sitting?
4. What is a good sitting position? What exercise will help in securing it?



AS THE TWIG IS BENT THE TREE IS INCLINED.

CHAPTER V

HEALTH HABITS IN WALKING AND WORKING

As you watch an automobile roll along the street, you know it is the machinery inside that makes it go. Have you ever wondered what it is that moves the body along when one is walking or running?

If the skin were removed from your arm so that you could see the flesh underneath, some of it would look yellowish white, and some of it red. The yellow flesh is fat, and the red flesh is *muscle*. The muscle of all animals looks alike. The lean meat of beefsteak is dead muscle. Living muscle is the machinery which moves all the parts of the body. It is by its action that we walk, run, jump, climb, throw a ball, laugh, sing, and perform all other movements of which any one of us is capable.

Each of us has in his body about five hundred muscles of various forms and sizes. They are arranged over the bones in such a way as to cover them and make the body plump and shapely. Most of the muscles are in pairs; that is, there are two alike, one for each side of the body.

Usually, the muscles are made fast to bones. Between the two bones to which a muscle is tied, there

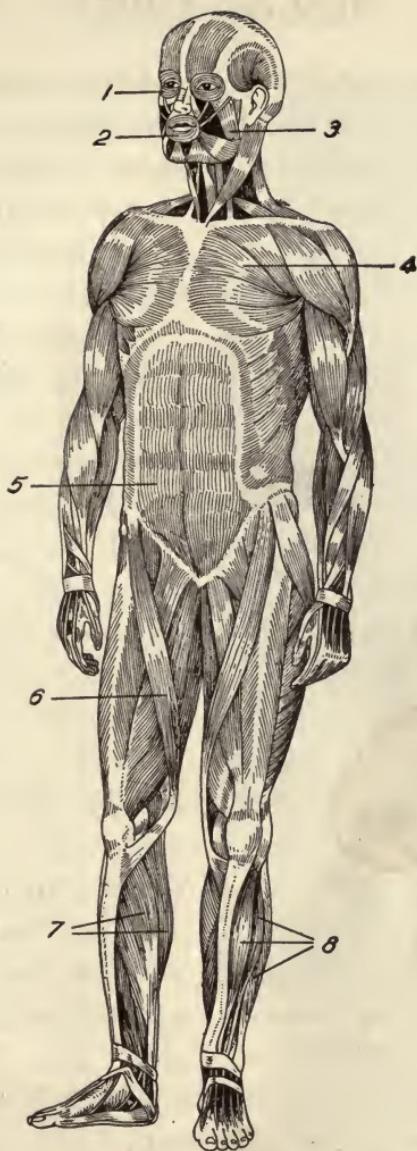
is a joint. One end of the muscle is attached to one bone, the other end to the other bone. Why this arrangement, do you think? But sometimes one end of a muscle is made fast to a bone, and the other end to the skin or to another muscle, as in the face. We use muscles of this kind when we smile.

Many of the muscles are not joined to the bones directly but are made fast to them by means of firm cords, called *tendons*. If you will place the fingers of one hand on the wrist of the other, at the same time working the fingers of the latter, you can feel these tendons moving underneath the skin.

All muscles have the power to become shorter, to *contract*. With your left hand grasp your right arm just in front of the elbow. Close the right hand tightly, then open it several times. You will feel something moving. It is the working of the muscles, which shorten and harden when they act, thereby causing the movement which you feel.

Each muscle is a living machine. One curious thing about this machine is that generally the more it works **Use makes a muscle healthy** the stronger it grows. It needs rest, of course. But if we would keep a muscle healthy, we must put it to use.

Brisk walking makes a great many of the muscles of the body work. Walking is a splendid health habit, when one walks correctly. But one must keep an erect position. Let the arms swing easily by the side. Many persons walk with their knees bent, but this is



1. MUSCLE WHICH CLOSES THE EYE;
2. MUSCLE WHICH CLOSES THE MOUTH;
3. MUSCLES USED IN CHEWING;
4. MUSCLES USED IN SWIMMING;
5. ABDOMINAL MUSCLES;
6. THE TAILOR MUSCLE;
7. CALF MUSCLES WHICH EXTEND TO THE FOOT;
8. MUSCLES WHICH BEND THE FOOT.

neither natural nor graceful. One should not walk stiffly; each step should have spring in it, as though one felt a joy in every movement. One ought to be as light on his feet as possible to avoid fatigue. When

we are walking, the strides should not be too long.

One day Harold, a boy I knew, who was very careless in his walking, was slouching along with his shoulders thrown forward and his head drooping. His cousin, who owned a camera, took a snapshot of him. Later the cousin sent this to Harold. Harold could hardly believe it was himself. He made up his mind that he would correct his bad posture, but this he found was by no means an easy thing to do. The plan he liked



A SLOUCHY POSTURE IN WALKING LOOKS
BAD AND IS TIRESOME.

best was to walk a mile every day carrying a tray or a basket balanced upon his head.

Running, leaping, and skipping are other modes of using the limbs in moving from one place to another. Running differs from walking in that both feet never

touch the ground at once and part of the time both feet are off the ground at the same instant.

Sometimes, when boys saw wood or shovel snow, they make their backs bend too much. This cramps the organs within the trunk so that they cannot do their work well. Then the worker gets tired much more quickly than if he kept the body in good position and bent only at the hips. A glance at the pictures will remind you of various ways in which boys and girls, as well as men and women, often assume wrong postures. Can you call to mind other ways? If you will test the matter, you will find it is always easier for the body to do whatever you need to have it do when you keep it in a correct posture than when you are crooked or slouchy.

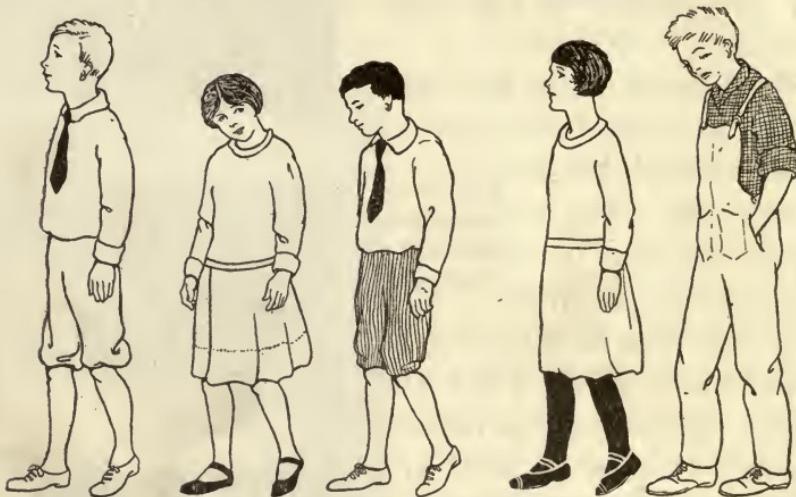
Body posture affects work and exercise



IN RUNNING, BOTH FEET NEVER TOUCH THE GROUND AT ONCE.

HEALTH HABITS

REMEMBER: You can walk, run, jump, climb, or do any kind of work more easily and better if you culti-



WHICH OF THESE CHILDREN WILL WALK THE FARTHEST WITHOUT GETTING TIRED?
WHY?

vate the habit of holding the body so that none of its organs will be cramped.

HEALTH PROBLEMS AND PROJECTS

1. Count the number of muscles you can discover by feeling the different parts of your body. What must one do to find some of the smaller muscles that move the fingers, toes, jaws, and other parts?
2. Show where the muscles are that are used when you throw a ball; when you pull a rope in a tug of war; when you run; when you jump; when you chew your food; when you rise from your bed in the morning.
3. What would happen to the muscle in your right arm if you should tie up the arm for a month? Why?

REVIEW QUESTIONS

1. What is it that moves the body when one is walking or running?
2. How many different muscles are there in the body?
3. How are the muscles arranged in the body?
4. What is the arrangement by which the muscles move the bones?
5. What is meant by *tendons*?
6. What is meant when it is said that a muscle *has the power to contract*?
7. What is necessary in order to make a muscle stronger?
8. What is the best position when carrying a pail of water? In climbing a hill or stairs?



CHAPTER VI

HEALTH AND EXERCISE

To keep the muscles strong so that they can do us good service we must *use* them. In other words, we must *exercise*. If you will look at the picture of the muscles on page 35, you will notice that every part of the body is covered by them. Every part of the body, then, must have exercise that it may be kept strong.

If we exercise but one part of the body, only that part becomes strong. Most persons can lift more with the right arm than with the left. How do you explain this? Why does a blacksmith have a strong right arm? Boys and girls who do not take enough exercise are likely to be pale and puny.

The self-acting muscles and exercise Besides those muscles which make the fleshy part of the body and which we are able to use at will, there is another kind of muscle which is *self-acting*.

Sneezing and hiccoughing are caused by muscles of this kind, and that is the reason we cannot easily stop them. The self-acting muscles act when it is necessary that they should, even though we may not wish them to do so.

All the movements of the body are made by means



IN WHICH POSITION WILL MARY BE THE MORE TIRED AFTER AN HOUR'S WORK? WHY?



HAS FRED A GOOD POSITION IN HIS WORK? WHY?

Is THIS BETTER?

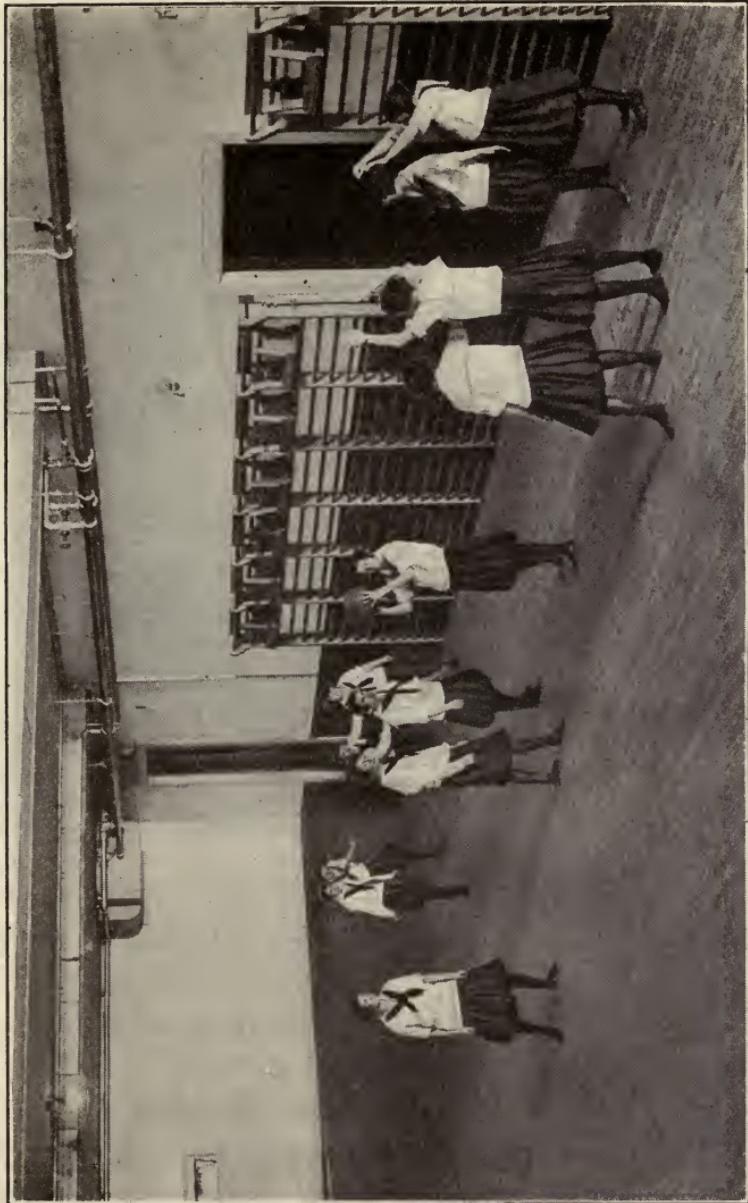
HEALTH HABITS

of muscles. The food we eat is moved along from one part of the body to another by the action of muscles, and the blood into which it is finally made is carried to all parts of the body by means of muscles. This occurs when we are asleep, as well as when we are awake, because the muscles that do the work keep on acting even when we do not think about them. The work of the self-acting muscles is wonderful indeed. We shall learn more about them later.

Exercise benefits both kinds of muscles. It makes the whole body feel fresh and causes every part of it to tingle with new vigor and power. It gives one a good appetite. It gives him refreshing sleep. One can study better and will feel better-natured and happier when he has enough of the right kind of exercise.

One may exercise muscles either in work or in play. Active play and almost all kinds of work which children have to do, such as chores about the house and garden, are good forms of exercise. How to exercise Brisk walking, jumping, skipping and climbing are good ways in which to take exercise. Swimming is splendid exercise. Bicycle riding, when one keeps a good posture, and does not overdo it, is fine exercise; but the joy of moving rapidly over the ground on a wheel often tempts the bicyclist to ride too fast or too long. He may thus be injured instead of helped. One should always feel refreshed and not exhausted after his exercise.

Exercise must be taken *daily*. We need it just as we



"THIS GAME MAKES US FEEL FINE AND FIT."

need food and drink, *every* day. Long walks once or twice a week are good but are not so good as regular exercise daily. Why? Suppose you should try to eat



Photo by Brown Bros.

BASEBALL IS ONE OF THE BEST FORMS OF EXERCISE.

in one day all the food needed for a week. What would be the result?

We may say there are three kinds of exercise: gentle, moderate, and violent.

Gentle exercise does not make one tired or out of breath. It is best for weak, sickly, or very old persons. Riding in a carriage or an automobile and slow walking are gentle exercises.

Moderate exercise, if kept up long, may make one tired but not out of breath. Walking at the rate of three miles an hour, light gymnastics, friendly boxing, and nearly all kinds of ordinary work in the house, on the farm, or in the factory are examples of moderate and healthful exercise.

Violent exercise puts one out of breath and quickly tires one, especially if he is not in good training. This kind of exercise is overdone very easily. Moderate exercise is best as a rule. Hard running, hard rowing, fast bicycle riding, hill climbing, and a good many school sports and athletic exercises are often violent and should not be indulged in to the point of utter weariness or exhaustion. Of course some persons can take part in violent exercise with less injury than others.



© Wide World
AN EXHAUSTED CYCLIST AT THE CLOSE OF
THE RACE.

HEALTH HABITS

If one begins at first with something easy and every day does a little more, he may after a time be able to endure a great test.

There is an old story of Milo, a Greek, who one day found a little calf. He took it upon his shoulder and

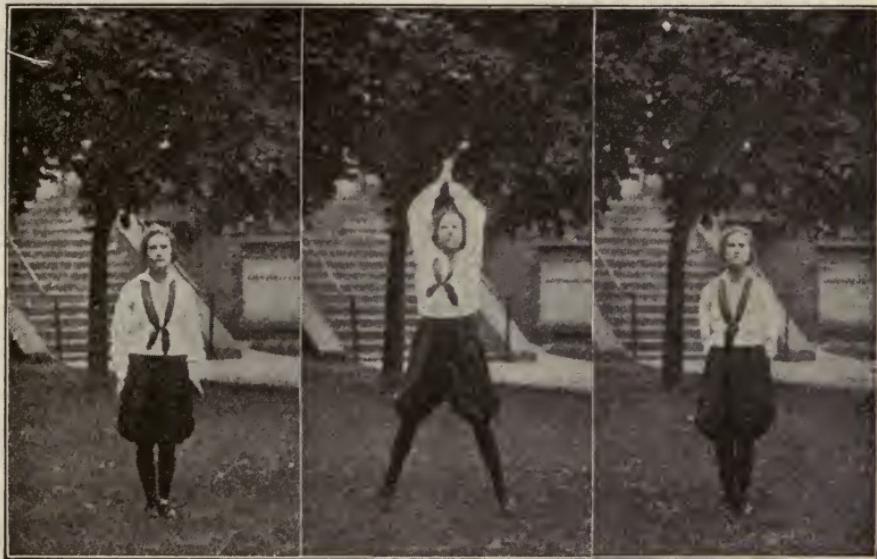


SWIMMING IN CLEAN, FRESH WATER, WHETHER IN A POND, A RIVER, A LAKE, OR
THE OCEAN, IS VERY FINE FOR THE HEALTH.

carried it around the ring of a great amphitheater. The next day he carried it again, and so on every day for months. The calf grew in size, but Milo's strength also grew each day. At last he was able to shoulder the full-grown ox and to carry it as easily as he did

the little calf. This he could not have done without the daily practice. How does the point here apply to your own work and play?

Violent exercises, such as hard running, climbing, jumping the rope, and rapid bicycle riding, should never be continued more than a few minutes at a time with-



(1)

(2)

(3)

BODY-WARMING EXERCISE.

out an interval of rest. Moderate exercises, such as walking, interesting games, swimming, and out-of-door work, are usually best for developing and maintaining a strong and vigorous body.

It has been shown that smoking even one cigar usually lessens the power of a muscle to do work. Cigarette smoking or the use of tobacco in any form is

harmful to some extent, at least to one who is growing and who wishes to put his muscles to the best use. One who wishes to become a vigorous and healthy person will avoid all habits which compel him to take poison into his system. Life insurance experts state



HAND-WARMING EXERCISE.

that the number of smokers who do not live to be old men is ten per cent greater than that of nonsmokers.

Unless one is working or playing out of doors much of the time, he ought to spend a few minutes every **Health exercises** day — the same time every day — in health exercises. He will be well repaid in health and good feeling for all the time he spends in this way. The following are good health exercises which you will enjoy. See how well you can do them.

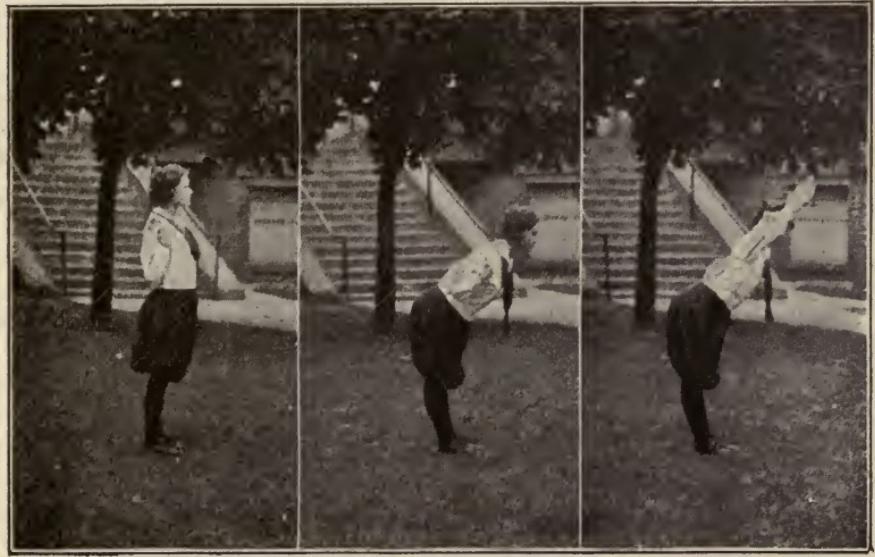


(1)

(2)

(3)

EXERCISE FOR INTERNAL ORGANS.



(1)

(2)

(3)

POSTURE EXERCISE.

Body-warming exercise (1) Stand erect, head high and chest up; (2) jump to stride position and at the same time fling the arms upward and clap the hands above the head; (3) bring the feet together with a jump and fling the hands downward and backward with a clap behind. Repeat 20-30 times. This exercise improves the circulation.

Hand-warming exercise (1) Stand erect, holding the chest well forward and the head high; (2) fling the arms forward, crossing the arms in front; (3) fling the arms vigorously outward; (4) carry them backward till the hands meet with a strong clap behind. Take care to keep the chest well forward and the head erect during the entire exercise. Repeat 20-30 times, breathing deeply. This exercise helps to maintain a good posture and to develop deep breathing.

Exercise for internal organs (1) Stand erect, head high, chest up; (2) jump to stride position, at the same time turning slightly toward the right and throwing both hands over the right shoulder; (3) bend forward until the finger tips touch the floor; (4) raise the trunk, jump back to original position. This exercise is fine for the liver, kidneys, intestines, and other organs.

Posture exercise (1) Standing erect, arms at sides, bring hands to shoulders, elbows to sides; (2) bend forward, holding the trunk rigid and bending only at the hips; (3) extend the hands above the head with vigor. Repeat 10-15 times. This exercise strengthens

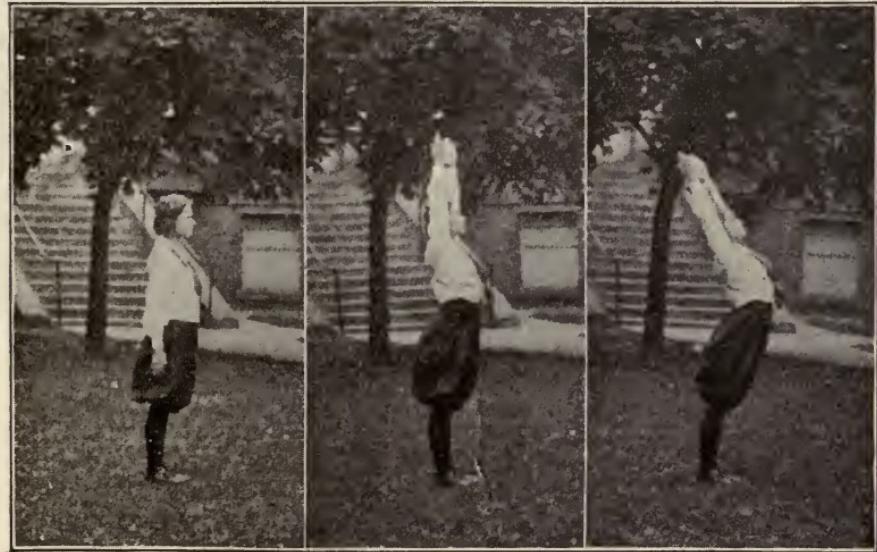


(1)

(2)

(3)

LEG AND TRUNK EXERCISE.



(1)

(2)

(3)

EXERCISE FOR THE TRUNK MUSCLES.

the muscles of the back, expands the chest, and develops a good standing posture.

(1) Stand erect, chest up and head high; (2) squat, resting hands upon the floor; (3) jump back, throwing the body into the position shown at (3); extend the legs backward, supporting the body with the hands and toes. Return to standing position. Repeat 10-20 times. This exercise develops the body, arm, and leg muscles.



BREATHING EXERCISE — SWIMMING.

Exercise for the trunk muscles (1) Stand erect, chest up and head high, arms at the sides; (2) stretch arms upward with vigor, reaching up as far as possible; (3) bend backward, keeping the arms in line with the

trunk. Repeat 5-10 times. This exercise strengthens the muscles of the abdomen and back.

(1) Standing erect, head high and chest up, bring the hands together in front; (2) extend hands forward vigorously with palms down; (3) move arms sidewise, palms directed backward, breathing in. Breathe in while moving the arms sidewise, and breathe out while thrusting the arms for-

Breathing
exercise—
swimming



(1) (2) (3)
BALANCING EXERCISE.

ward. Repeat 8-10 times. This exercise is valuable for good posture and development of arm muscles.

(1) Standing, place hands on shoulders, Balance elbows at sides; (2) bend forward, carrying exercise one leg backward in line with the trunk; (3) continue

HEALTH HABITS

bending the trunk forward and raising the leg backward until the leg and trunk are horizontal, slightly bending the opposite leg. Repeat 5-10 times. This is a capital exercise for the muscles of the legs and trunk.

REMEMBER: The body grows best by daily exercise in which all the muscles are tested vigorously but not so hard or so long as to injure them. With right practice harder exercise may be taken each succeeding day.

HEALTH PROBLEMS AND PROJECTS

1. Find out as many acts as you can that are done by your body or within your body which you cannot control by trying to do so. Explain how these acts are possible, though you do not knowingly perform them.
2. Mention ten good ways in which boys and girls from nine or ten to fifteen or sixteen years of age might take exercise in your neighborhood.

REVIEW QUESTIONS

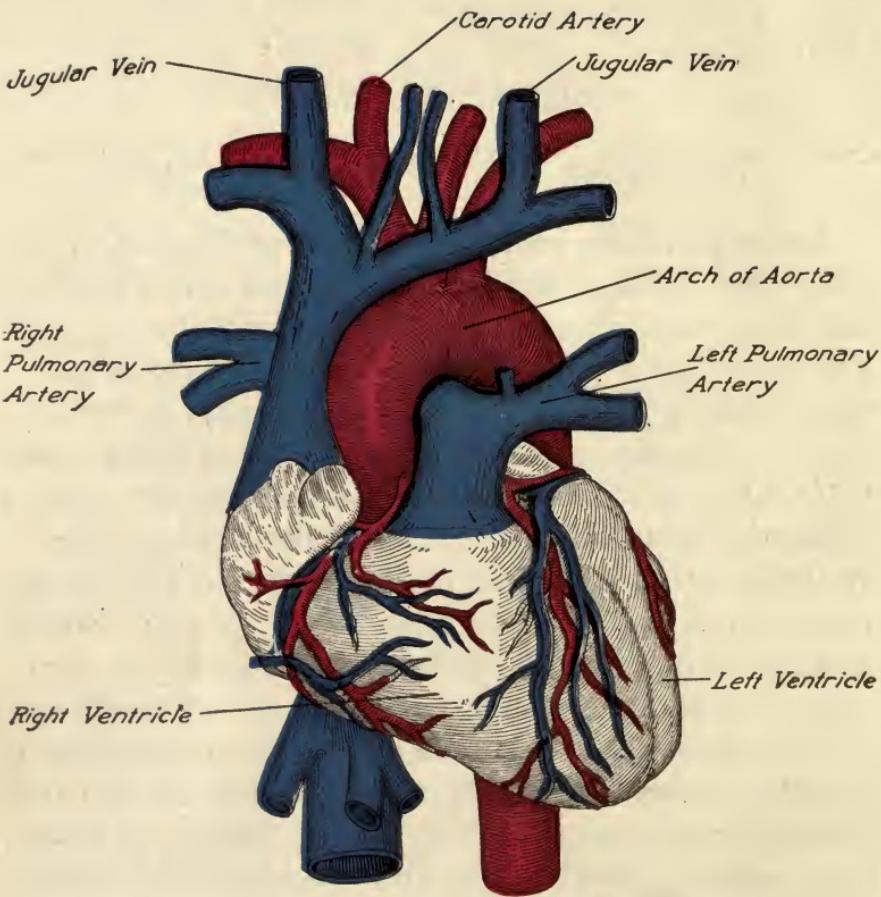
1. Why is exercise necessary?
2. Do all parts of the body need to be exercised? Why?
3. What would happen to a baby's arms and legs if they were bound so that they could not be used?
4. What is meant by the *self-acting* muscles?
5. Do any of the muscles act while we are asleep? Mention some acts they perform.
6. What are some good forms of exercise?
7. How frequently should exercise be taken?
8. What kinds of exercise should be avoided?
9. How can one increase his strength so that he can do more work **every day**?
10. What habits injure the muscles?

CHAPTER VII

THE HEART AND THE STREAM OF LIFE

AFTER you have been walking fast or running, if you place your hand on the left side of your chest, you will feel something beating inside. No doubt ^{The work of the heart} you know this is your heart. It beats all the time, although you may not always be able to feel it. During your whole lifetime your heart never stops beating. If it should cease its work even for a minute, you would die. It does not always beat at the same rate. When you run or jump, the heart beats much harder and faster than when you are sitting down or standing still. It beats most slowly as a rule when you are lying down.

Place your hand over your heart, and count its beats for exactly one minute. Quite likely you will find that it beats from seventy-five to eighty times. A baby's heart works very fast, sometimes beating one hundred forty times a minute. As a person grows older, the heart beats more slowly; and in adults the average is about seventy-two beats a minute, or, when lying down, one beat every second. Excitement makes the heart beat faster; so does fright or anger. What other experiences will make it beat faster than usual?



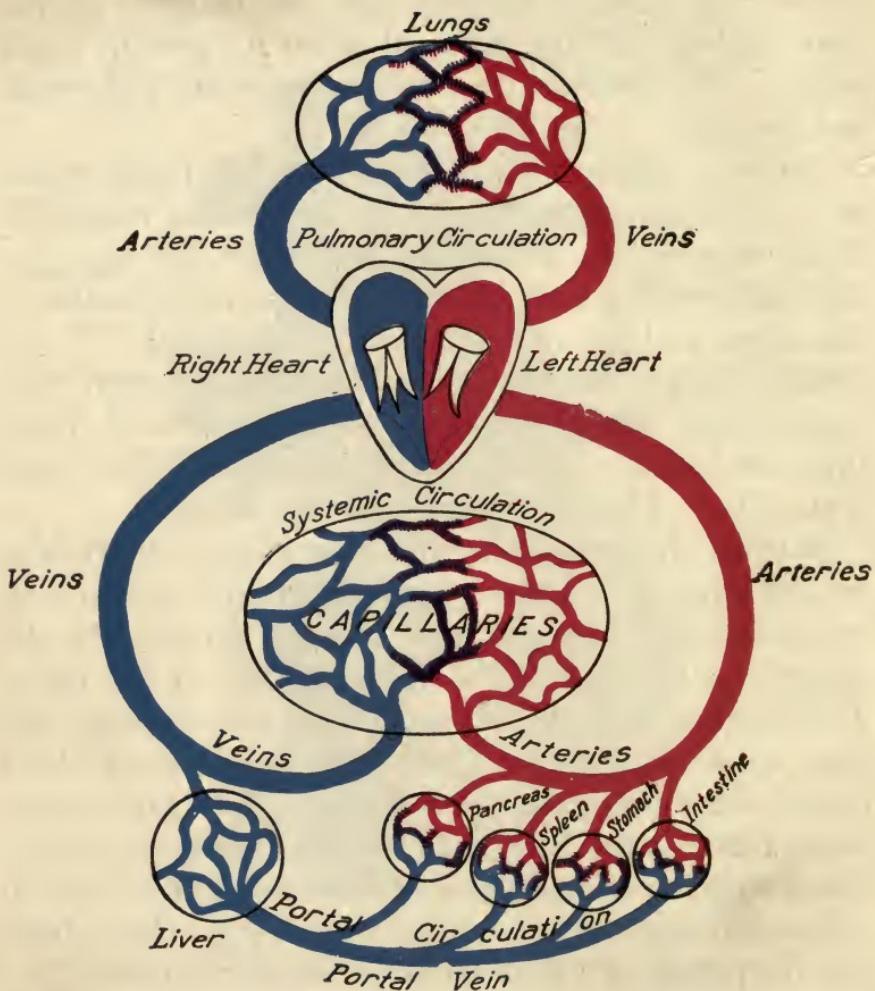
SO LONG AS WE LIVE THE HEART SENDS THE STREAM OF LIFE THROUGH THE BODY.

We have already learned that the body is all the time needing building material either for growth or for repairs. To provide this material we eat and drink and breathe.

But our eating and drinking and breathing would do us very little good if it were not for the wonderful living stream, the blood, which gathers and distributes to the body the necessary material, just when and where it is needed. This vital stream, besides distributing the building materials, also washes away the old and worn-out particles wherever they are found. An ancient prophet said, "The blood is the life." Modern science says the same.

But this wonderful living stream does not flow straight on like a brook or a river. It flows around and around, or *circulates*, in the body. It is kept moving like the water in a fire hose — by the action of a force pump. The beating heart is this wonderful force pump. At each stroke, or beat, it forces twelve ounces of blood into the channels nature has provided for carrying the blood through the body. In one day the heart pumps blood equal to one hundred fifty barrels. Of course no one has so much blood as this in his body. Only about one thirteenth of a person's whole weight is blood.

In its round of service the blood always starts from the heart. The course is completed by its return to the heart. The circulation is so rapid that a quantity of blood equal to all there is in the body passes through the heart every half minute.



THE CIRCULATION OF THE BLOOD. START AT THE HEART AND TRACE THE COURSE OF AN IMAGINARY DROP OF BLOOD FROM THE TIME IT LEAVES THE HEART UNTIL IT RETURNS.

The heart is a hollow muscle shaped like a pear. Each person's heart is about the size of his fist. The heart of a little baby, then, is quite tiny. A man with a big fist usually has a large heart, because his body is a large one, and it needs a good deal of blood service to keep it in working trim. The heart of a whale is as large as a washtub, while that of some small creatures can be seen only through a microscope.

The heart is double; or rather there are two halves, separate yet bound together, both beating at the same time, like two boys walking arm in arm and keeping step. Each part of the heart has an upper and a lower reservoir. Into the two upper reservoirs the blood that is returning to the heart is pouring all the time. From the two lower ones blood is as constantly being sent forth on its course through the body.

The blood travels about in three different kinds of tubes or *blood vessels*. The vessels that take the blood from the heart are called *arteries*. Those which bring it back to the heart are the *veins*. These two sets of tubes run side by side through all parts of the body. At the ends farthest from the heart they are connected by many tiny tubes called *capillaries*. So numerous and so close are these capillaries that one cannot stick a pin through the skin anywhere without tearing many of them and letting out blood.

My little neighbor, talking to a schoolmate just out-

side my open window, said, "I used to think blood was *red fluid*, just as ink is a *black fluid*." "Well, isn't it?" asked the other, "it surely looks red."

"Oh, that's because we can't see it plainly with our eyes," she replied. "The other day I looked at a drop of blood through the microscope, and the liquid had no more color than water, but there were many little round, flat things floating in it. They made me think of reddish colored fish, only they looked more like tiny red plates, or disks, thinner in the middle than at the edge. Part of the time they formed themselves into rows with their sides together, and then they looked like a roll of pennies floating along. They moved around so much I thought they were alive."

The little girl was right. The disks she saw were *red blood cells*, and they were alive. Each one of them leads as separate a life as do the fishes that swim in the water or the birds that fly in the air. There are many millions of them in a single drop of blood. It is their business to take up *oxygen* from the air in the lungs and to carry it around the body. Each cell can carry a load of oxygen much larger than itself. These red cells give the blood its color. Yet it is only when they are laden with oxygen that they are really red. When they have given up their oxygen and are returning through the veins to the heart, they have a dark purplish color.

If my little neighbor's eyes had been keen enough, she would have seen a few larger *white cells*, perhaps

somewhat different in shape. They are not so easily seen and not nearly so numerous as the red cells — only about one white to every seven hundred red ones.

The white cells have something to do with keeping up repairs in the body. As they speed along with the blood, they are on the watch and stop just where they are needed to do any kind of repair work. And there is another thing the white cells do. When by any chance disease germs get into the blood, the little white cells capture and destroy them. If the white cells are healthy and if there are enough of them, they always win in their struggles with germs. Sometimes these *body defenders* have to battle with such an army of germs that they are beaten, and then the germs may make a person very ill. Whenever the white cells are so weakened that they cannot overcome the germs, the body becomes the victim of these dangerous foes of life.

The health habits about which we are learning greatly aid in keeping these watchful little bodyguards, the white cells, in condition to protect us from disease.

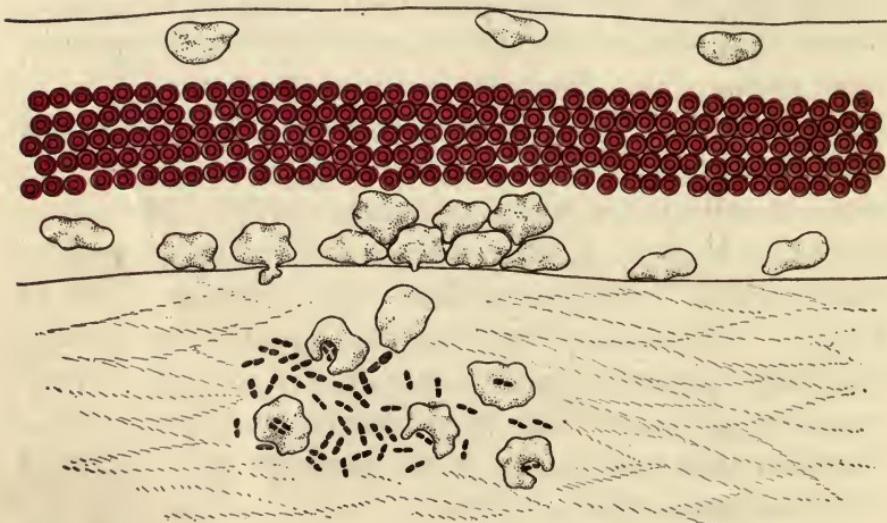
The fluid portion of the blood, in which the white cells and the red cells move, is made up of the water we drink and the food we digest. The blood has in it too some special substances which, when one is in health, destroy disease germs. These substances so weaken the disease germs that the white cells can quickly overpower them.

When the body is injured, as when the flesh is cut or

The war-
rior white
cells

crushed, the blood must repair the injury. An injured part is red because it is filled with the blood which has come to repair it. You can see, then, why the blood is called the *Stream of Life*.

With all there is for the blood to do, we can under-



THE BLOOD CELLS. NOTE THE DIFFERENT COLORS. WHY THIS DIFFERENCE?

stand why it serves us best when it is made out of wholesome food, pure water, fresh air, and life-giving materials. Poor food makes poor blood, which in turn does poor work for the body. Too little food brings about the same result. On the other hand, if the blood is loaded with useless materials or with poisons, every cell and tissue suffers. The brain is dull, the muscles are weak, the whole body is without energy or strength.

If we should take a drop of blood from the finger of a person who is getting too little sleep, we should find the red blood cells far too few in number. This is one reason why loss of sleep makes one look pale.

Not very long ago some very interesting experiments were made by a physician upon four young men. From the finger of each a drop of blood was drawn and carefully examined. All were found to have good, healthy blood. These young men commonly drank only pure water; but on this day they were each given two ounces of port wine. Two hours later another blood test was made. The result showed that the blood had lost some of its power to defend the body against the germs of disease. Another experiment in which they were given two ounces of a patent medicine containing alcohol, the test being made four hours later, showed that the blood was injured to a still greater extent.

It has long been observed that persons in the habit of using drinks containing alcohol are usually the first to take such dread diseases as cholera and yellow fever. Another thing has been noticed; namely, that such persons do not recover from accidents and surgical operations so readily as do persons who drink only water.

If a drop of alcohol be added to a drop of blood, it will almost instantly destroy the blood cells. While ordinary alcoholic drinks, such as beer and wine, do not destroy the blood cells so quickly, still these drinks interfere with the proper work of the blood. The body of a person who is in the habit of using strong drink is

like a city whose policemen are all asleep on duty. The enemy is likely to come in without resistance. Tobacco also injures the blood to some extent.

The heart is an especially strong muscle. It has need to be strong, for though it is small it must do a great amount of work. In twenty-four hours ^{Take care of the} it does as much work as would be done by a heart! man in lifting five hundred stones weighing fifty pounds each. Think of it! And it works at that rate for a lifetime. Never for a moment can its work be laid aside. The small pause between beats gives it some rest. It rests most when we are asleep. Why?

Exercise makes the heart send the blood surging to every part of the body, nourishing it and washing out its waste. This of course is good for the body. But care must be taken to avoid injury to the heart by too violent exercise. You should know that violent exercise, as running so hard or riding a bicycle so fast as to get one out of breath, may injure the heart by overworking it.

Careful experiments have shown that even a small amount of alcohol may make the heart beat four or five times more each minute than it otherwise would; that is, 6000 or 7000 extra beats in twenty-four hours. This is as much work as would be required to raise a fifty-pound weight one foot two hundred eight times. Besides, the heart has to beat so much more rapidly to do this extra work that its rest pauses are shorter.

Thus it has to do more work even while it has less time for rest.

When a person has the habit of using tobacco in any form to excess, his heart is affected, and it generally beats more times a minute than the proper number. It may beat even as often as 112 times a minute. Think what a lot of extra work such a heart must do! The extra beats are labor lost and tend to wear out the heart. After a while it may get so tired that it cannot force all the blood needed to every portion of the body. Then the whole body may become diseased.

REMEMBER: The heart is to the body what the mainspring is to a watch. Every organ depends upon its healthy action. It is strengthened by wholesome, vigorous exercise; but do not overtax it or weaken it by alcohol or tobacco.

HEALTH PROBLEMS AND PROJECTS

1. Does your heart beat while you are asleep? How can you tell?
2. Can you tell whether the stream of blood goes up into your head, out into your hands, and down into your feet? How?
3. Put your finger on an artery and then on a vein in your wrist. What is the difference between the way a vein and an artery feel to you?
4. Have you noticed that when you hurt any part of the body or when any part of it is sore, there is usually a swelling about the place? Explain this.
5. Why does the heart beat so rapidly when one has a fever?
6. If the doctor calls when you are sick, why does he always feel your pulse?

REVIEW QUESTIONS

1. On what side of the body can you feel the heart beat?
2. How can you make the heart beat hard and fast?
3. When does the heart beat most slowly?
4. How are the materials needed for building and repairing the body carried around to different parts?
5. How much blood does the heart pump in one day?
6. The blood is what part of the weight of one's body?
7. How is the heart constructed?
8. Describe the reservoirs in the heart.
9. What is the use of the capillaries? The veins? The arteries?
10. What gives the red color to the blood?
11. What do the red blood cells do for the body? The white cells?
12. How does the blood get the fluid in which the cells are carried about?
13. How can one best keep his blood in good condition, so that it can do its work easily and thoroughly?
14. How does too little sleep affect the blood cells?
15. How does alcohol affect the blood cells?



IF THE WORK DONE BY THE HEART IN A SINGLE DAY WERE DONE ALL AT ONCE, THE HEART WOULD PERFORM A TASK HARDER THAN THAT SHOWN IN THE PICTURE.

CHAPTER VIII

FRESH AIR INDOORS

A PERSON may go without eating for a month or without drinking for several days and still live; but if



THERE ARE ABUNDANT SUNSHINE AND FRESH AIR IN THIS SLEEPING PORCH.

a man were deprived of air, he would die in a very short time. We have seen that the best air is outdoor air. Even when we must be indoors, we should try in some way to get enough pure out-of-door air to breathe.

How air becomes impure We have seen that dust is apt to make air unhealthful. Anything that rots or decays, like potatoes and other vegetables in the cellar and swill barrels and garbage heaps at the back door, may spoil the air. The chief reason why both dust and bad odors are harmful is that they often carry with them very small living things called *microbes*, or *germs*. These are so small that they cannot be seen by the naked eye. It takes a strong microscope to make them out. There are a good many kinds of them, and they are capable of doing us great harm, as you will learn in later chapters.

A microbe, if it had food enough to feed on and conditions favorable for growth, might produce more than two hundred fifty billion microbes in one day. One microbe is so small that it could do no great harm if it were not for its very rapid growth.

Fortunately most of them do us no harm. Many of them are really our helpers, because they feed on harmful germs and destroy them. Certain ones, however, are the cause of such diseases as *tuberculosis*, *typhoid*, *diphtheria*, and other deadly ills.

Another way in which the inside air is made impure is through the change produced in it by the breathing of people and animals.

We can easily prove this fact by a simple experiment. For this we shall need a fruit jar, a candle, and a piece of wire about a foot long. The candle is fastened to the end of the wire and let down into the bot-

tom of the jar. Now we shall place the cover on the jar and see what happens. You notice that the candle soon begins to burn dimly, and before long it goes out altogether.

Why will the candle not burn in the closed jar? Try the experiment again; and when the candle light be-



THE CANDLE EXPERIMENT. (1) BURNING BRIGHTLY; (2) BURNING DIMLY;
(3) GONE OUT. EXPLAIN.

gins to get dim, bring it out at once into the air. What do you find? Explain the facts which your experiment shows you.

If instead of a candle we should shut up a mouse in the fruit jar, it would live only a little while. Its life would go out, just as the light of the candle goes out. A child shut up in an air-tight box or small space would soon die from the same cause.

Something besides heat comes from the burning of wood or coal. The smoke escapes through the chim-

ney, and the ashes remain in the stove; these are the waste parts of the fuel.

A kind of burning, or *combustion*, as it is called, is going on in our bodies all the time. This burning produces something like the smoke and ashes made by the fire in the stove. Get a drinking glass and a glass tube



WHY DOES THE LIMEWATER BECOME MILKY?

or a good stout straw. Into the glass put limewater, which you can get from a druggist. Breathe two or three times through the tube or the straw into the limewater. You will notice that it begins to look milky. Soon it becomes almost as white as milk. This is because the limewater catches and holds the *carbon dioxide* which we breathe into it.

Every time we draw in a breath of pure, fresh air, the body keeps and uses some of the oxygen, and in its stead carbon dioxide is breathed out. So each time we breathe out, we make the air around us impure by the breath we expel. If we are out of doors, the used air from the lungs is carried away. But if we have only a roomful of air on hand, we shall in time be breathing spoiled air unless we have some means of supplying fresh air.

If one were in a closed room into which no fresh air could get and the air were *dead*, as we say, it would become so impure that the person in the room would be injured. Many years ago when the British people were having war with India, one hundred forty-six English soldiers were taken prisoners. Their captors thrust them into a room twenty feet square. It had two very small windows, but the amount of air that could enter through these was not nearly enough for so many soldiers. In a short time the oxygen in the air became so nearly exhausted that the soldiers began to suffer great torture. By morning only twenty-three of the whole number were alive. This room in which so many died for want of air is known in history as "The Black Hole of Calcutta."

There are other changes in the air caused by breathing which may be much more important than the exchange of pure oxygen for carbon dioxide gas. One of these is the addition of moisture. There may be others not yet fully understood. It is certainly known that

air which has been once breathed is not the best to breathe again and that a liberal supply of fresh air is constantly needed to carry away the used air which we send out from our lungs.

The only way to obtain the fresh air needed when



WHICH WOULD BE BETTER, TO PLAY THIS GAME INDOORS OR TO PLAY IT OUT OF DOORS?

we live indoors is to have some means provided by changing the stale indoor air which the outdoor air may be brought in to us and the air within which has been used and has become impure may be carried out. Changing the air in this way is called *ventilation*. Every house, schoolhouse, church, store, or other building where people work or play or live ought to be well

ventilated. Many persons ventilate their houses by leaving the doors and windows open. This serves well in warm weather. In cold weather it is not a very good way, as it causes drafts and makes the floor so cold that it is hard to keep one's feet warm. It is much better to have the air brought fresh from the outdoors, then warmed by a heater before it enters the rooms.

Air does not move of its own accord. A current of air must be produced in some way that it may move in and out of rooms. To ventilate a room there must be both an *inlet*, a way for fresh air to get in, and an *outlet*, a route for the foul air to get out.

Try this experiment: Take a tall glass jar. Attach a small piece of candle to the end of a long wire, as shown in the picture. Light the candle, and lower it into the jar. At first it burns brightly. By and by it grows dim and finally goes out, leaving just smoke. This happens, as we have learned, because the carbon dioxide which is made by the burning of the candle and which is heavier than the air settles to the bottom of the jar and puts out the flame. Let us put into the jar a piece of pasteboard notched at the



CANDLE EXPERIMENT SHOWING THAT AT LEAST TWO OPENINGS ARE NECESSARY TO INSURE GOOD VENTILATION.

bottom, thus making a partition in the jar. Light the candle and place it in the jar. Now the candle continues to burn brightly because the fresh air comes in on one side and the foul air passes out on the other; that is, the jar is ventilated, as our living rooms and work-rooms should be, by means of at least two openings.

If there is no way of ventilating a room except by windows, two openings of some sort must be provided. The upper sash may be lowered a foot to allow the used air to pass out, and the lower raised a foot to admit the fresh air; or if there are windows on opposite sides of the room, open each a little way, one for the fresh air to come in, the other for the used air to get out.

How far the windows should be open must depend upon how many persons there are in the room; also how many pet animals there are; whether there are gas jets or lamps burning; how large the room is; and how much furniture there is in it. When a strong wind is blowing and in very cold weather, small openings may be sufficient, while large ones are needed when the air is quiet. Each lighted gas jet or lamp spoils as much air as a person.

There are several ways in which houses are ventilated, but the general plan is the same for all—an inlet for fresh air and an outlet for used air, with something to make a draft between them. If the air enters directly from outdoors, the outlet must be near the top of the room, because the warm air rises and the

air already in the room is warm air that has been used.

If the air is warmed by a furnace or some similar means before it enters the room, the outlet should be placed at the floor, because, when the pure air enters



THE UPPER SASH IS LOWERED, AND
THE LOWER ONE IS RAISED.



DRAFTS MAY BE AVOIDED BY THE USE OF A
WINDOW BOARD AT THE BOTTOM OF A WIN-
DOW WHICH IS OPENED FOR VENTILATION.

the room warm, it first rises to the upper part of the room, and then as it cools and at the same time becomes impure it settles to the floor, where it should be taken out.

The air of sleeping rooms should be as nearly like

out-of-door air as possible. Windows should be opened wide, and a free movement of air secured.

Air that has become foul through use has a musty odor, and, when we first come in from outdoors, we can smell it. After one has been in a badly ventilated room for a time, one's nose gets used to the odor, and



YOU CANNOT WORK OR STUDY WELL IN BAD AIR.

so one does not notice the bad air. It is a good thing to "follow our noses" when we detect the close, stale smell. If we heed this *danger smell* and seek some way to change the air, we may save ourselves much discomfort and harm. When the air in a room becomes spoiled, the people in it are likely to feel stupid or sick or to get headaches.

REMEMBER: You cannot work or study well in bad air, and you cannot keep your good health unless you have a supply of fresh, unspoiled air all the time. Air that is not in motion — dead air — is especially harmful.

HEALTH PROBLEMS AND PROJECTS

1. If you live in the city, do you have a garbage man remove your garbage frequently? Does the city require the removal of the garbage? Why?
2. What is usually done with the garbage in a small village?
3. What arrangements should be made for garbage removal?
4. What decaying things about country homes spoil the air? How can this evil be remedied?
5. Name some disease that is caused by the microbes, or germs, carried about in dust or bad odors.
6. Why are we so made that we dislike dust and bad smells?
7. How is your schoolroom ventilated? Where does air enter it? Where does the used air leave it?
8. How are the living room and the dining room in your home ventilated?

REVIEW QUESTIONS

1. If we must stay indoors a good deal, what should we try to do about the air we breathe?
2. In what ways may air be spoiled for our use?
3. What is the chief reason why dust and bad odors are harmful to health?
4. What happens to the air which is breathed into the lungs?
5. What is meant by the *combustion* that goes on in our bodies all the time?

HEALTH HABITS

6. What is meant by *carbon dioxide* thrown out from the lungs in breathing?
7. How could you show that carbon dioxide is in the air we breathe out?
8. How can we have a supply of fresh air if we live much indoors?
9. What is meant by *ventilating* a house?
10. What is the proper way to secure good ventilation in a house?



IS THIS BOY LAZY, OR IS HE POISONED BY BAD AIR?

CHAPTER IX

HEALTH HABITS IN BREATHING

EVERYTHING that lives must breathe. Plants breathe by means of their leaves, and fish by means of their gills, while earthworms breathe through their skins; but man has special organs designed solely for breathing. Why must every living thing breathe?

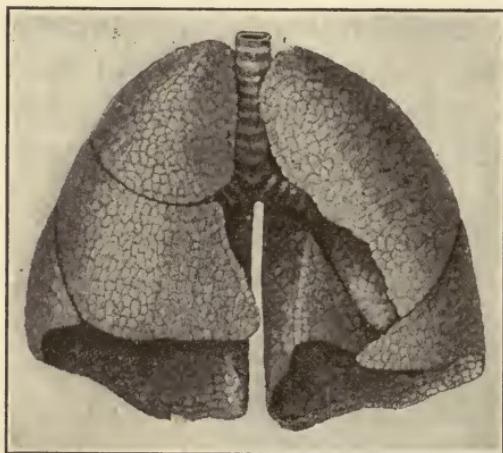
One day last spring Bertha was walking with her father along a stream, where she could hear the croaking of the frogs. "Watch," said her father, ^{Organs of} as a big one came to the top of the water, ^{breathing} "and see how he drinks air. He swallows a mouthful at a time, just as you drink water. That is the frog's way of breathing. If we could see the inside of his body, we should find there a queerly shaped bag with a tube running up to his throat. This is the frog's air bag; and when he comes to the surface, he swallows enough air to fill it. Then he can dive down into the water again and stay under until his supply of air is used up."

Every person has two air bags in his body. These are called *lungs*. Our lungs need to be emptied so often, however, that we could not live very long under water.

If you look on pages 16 and 83, you will see that the ribs and backbone together form a case. This case is for the protection of the delicate organs which are inside. The space within is divided into two parts, or *cavities*, by a very strong muscle, called the *diaphragm*. The upper cavity is the *chest*,

Our air bags—the lungs

the lower is the *abdomen*. The lungs lie within the chest cavity. They appear somewhat like a sponge, being masses of tiny sacs filled with air.



EVERY PERSON HAS TWO AIR BAGS, THE LUNGS, WITH WHICH HE BREATHES. DO THEY LOOK LIKE BAGS? WHY IS IT PROPER TO LIKEN THEM TO SPONGES?

Air enters the body through the *nostrils* (openings of the nose) and passes to the lungs through a tube called the *windpipe*, which begins at

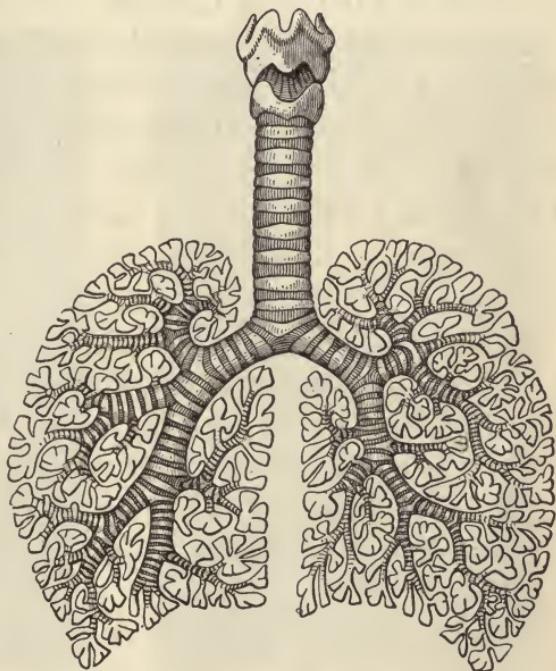
the back part, or *root*, of the tongue. The windpipe divides like a tree into two main branches, then into a great many smaller ones, some not larger than a sewing needle, each of which conveys a portion of the air to one of the little sacs that make up the lungs.

One can take air into the lungs through the mouth, but this is not the best way. When air is breathed through the nose, it passes down behind the mouth

through a moist, narrow canal. Here it becomes both moist and warm before passing on into the lungs. In the openings of the nose grow some stiff hairs that strain out much of the dust in the air we breathe. Finer dust and germs are caught and held by the moisture in the nose, as you can prove by blowing the nose after breathing dusty air. But when air is breathed through the mouth, it may reach the air passages and lungs cold, dry, and filled with dust; it may thus do much harm.

When going from a warm room into cold air, should one be careful to breathe through the nose? Why?

The reason why some children breathe through the mouth is because of growths that occur in the nose, which either close up the passages for air or make them so narrow that enough air cannot



THE LUNGS ARE COMPOSED OF LITTLE POCKETS, OR SACS AS THEY ARE CALLED, INTO WHICH THE AIR RUSHES WHEN WE BREATHE DEEPLY. WHAT BECOMES OF THE AIR THEN?

pass through. This trouble is a very common one. Quite recently it was found that in four hundred fifteen New York State towns, one eighth of the children were "mouth breathers." The number in other places is no doubt as great.

Some persons who know it is harmful to make a practice of breathing through the mouth keep the jaws closed and breathe through the nose during the day-time, but at night when asleep they open the jaws and unknowingly breathe through the mouth. In the morning when they awaken, the mouth is dry, the breath has a bad odor, and the voice is often hoarse. Such persons are likely to suffer from headache and a "dull" feeling.

If one keeps on breathing in this way, the shape of his mouth and nose may become changed, and the expression of his face altered.

If you have constant difficulty in breathing through your nose, you should ask your parents to take you to a physician to find the cause and to have the trouble remedied.

We require so much air all the time, and we need to have it changed so often, that nature has made our breathing apparatus so that it works a good deal like a pair of bellows. But there is this difference: in the bellows the air enters by one opening and goes out through another, while the air enters and leaves the lungs by the same route.

The bellows action of the lungs is made possible by

the *ribs* and *diaphragm*. The ribs are elastic, and each rib is connected to the adjoining one by muscles. One set of muscles draws the ribs apart, and another set draws them together again. The diaphragm, which is fastened along the lower borders of the lower ribs, is shaped like a dome and

The lungs
work like
a bellows



THE RIBS PROTECT THE LUNGS BUT PERMIT THEM TO EXPAND AND CONTRACT. SEE IF YOU CAN COUNT YOUR RIBS. SEE IF YOU CAN FEEL HOW THEY ACT.



THIS IS THE WAY THE RIBS LOOK WHEN THE LUNGS ARE FILLED WITH AIR. THE MORE THEY CAN BE EXPANDED, THE BETTER FOR HEALTH.

rises into the chest cavity. When we start to take a deep breath, the muscles pull the ribs apart, and at the

same time the diaphragm flattens itself down. This enlarges the cavity of the chest, and then air rushes in through the nose or mouth to fill up the space. When the muscles cease pulling, the ribs and diaphragm return to their former positions, thus making the cavity of the chest small again and forcing the air out through the nose or mouth.

This process is repeated every time one breathes. In health, we breathe eighteen or twenty times a minute. Children breathe faster than adults. Why is this true? We breathe faster when we run than when we walk. Why?

If very tight clothing is worn about the chest, the ribs cannot stretch apart so far as they should in breathing. Tight clothing also interferes with the action of the diaphragm, and so not enough air can be taken into the lungs. Cutting off the air supply in this way may harm the body. So you see that one should always wear his clothing loose enough to allow him to expand his chest fully with each breath.

About two thirds of a pint of air is taken in by a grown person and the same quantity forced out each time he breathes. The lungs are large enough, however, to hold almost a gallon and a half of air. Nature has provided us with much more lung room than we ordinarily use in breathing so that when we need to breathe much faster and deeper, as when we are climbing hills, running fast, playing ball, or otherwise exercising hard, we may have in stock enough air for our needs.

If anyone wants to have strong lungs, he must exercise them. The best way to do this is to take full, deep breaths all the time when at work or at play. We should form the habit of keeping a good posture because a bent and cramped position will prevent proper breathing. It is a good plan now and then to stop what we may be doing to take the following exercise: Place the hands on the hips as the girl in the picture is doing. Bend the head backward, lift the chest as high as possible, and take in long, deep breaths, then force the air out slowly while bringing the head up again. If you feel cold at any time, several deep breaths in this way will help to warm you.

Occasionally, when people are long under water or are struck by lightning, they may cease to breathe though still alive. They may sometimes be made to breathe again by means of *artificial respiration*. This is one way in which it may be done: Turn the person face downward upon the ground or floor. Place a firm roll — a large folded coat will do — under his chest as shown in the

Exercise
makes
strong
lungs



First aid,
artificial
breathing

"I CAN EXPAND MY CHEST FOUR INCHES WHEN I TAKE A VERY DEEP BREATH. CAN YOU DO AS WELL AS THIS?"

picture on this page. Then, standing astride of him with your face toward his head, place your hands, one on either side, over his lowest ribs. Bend your body slowly forward, then backward, pressing upon his ribs and, as you do so, lifting him slightly. Make the movement



ARTIFICIAL RESPIRATION. EMPTYING THE CHEST OF WATER.

a dozen times a minute. This should be continued until he breathes, which may sometimes require a considerable period of time.

In order to be able to employ artificial respiration in a time of need, practice the following: Have a person lie down on the floor or on a raised platform, face

upward and head hanging over one end. Then, while standing above the person's head, take hold of both his arms below the elbows, and draw them steadily upward above his head, holding them in position two or three seconds; then, allowing them to go back to position, press the elbows firmly against the sides of the chest. Drawing the arms upward will cause the air to rush into the lungs, and returning them to position and pressing against the chest will force the air out of the lungs. By repeating this simple operation twelve to sixteen times a minute, actual breathing may be very perfectly imitated.

Best of all is a *pulmotor*, or lung motor, by which the lungs may be filled and emptied

with regularity as in life. Many lives have been saved by the prompt use of this instrument.

REMEMBER: Anyone who wishes to have good health must form the habit of breathing through the nose; he must wear his clothing so loose that it will not prevent him from breathing deeply; and he must cultivate the habit of frequently taking full breaths.



THE PULMOTOR.

Courtesy Service Citizens of Delaware

THESE BOYS LEARN TO EXPAND THE LUNGS TO THE UTMOST WHILE THEY ARE TAKING THEIR SETTING-UP EXERCISES. THEIR AIM IS TO ACQUIRE GOOD BREATHING HABITS WHICH WILL CAUSE THEM TO BREATHE DEEPLY WITHOUT THINKING ABOUT THE MATTER.



HEALTH PROBLEMS AND PROJECTS

1. Show the class how the lungs work somewhat like a sponge.
2. Describe the movements of the ribs and chest when one breathes.
3. Do you know any persons who have the habit of breathing through the mouth? Why do they do so?
4. How can anyone form the habit of breathing through the nose during sleep as well as during waking hours?
5. Try this experiment: Tie a scarf or rope tightly about the chest. Then see whether you can run as fast or as far as you can run ordinarily. Explain.
6. Walking at ordinary speed, count the number of steps you take while you draw as deep a breath as possible. Compare what you can do with what other members of the class can do.

REVIEW QUESTIONS

1. By means of what organs do human beings breathe?
2. Where is the chest?
3. How is the chest cavity formed?
4. Why are the lungs said to be like a sponge in their action?
5. How does air enter the body?
6. Why should one avoid the habit of breathing through the mouth?
7. What will happen to the shape of the mouth and chest if one breathes through the mouth all the time?
8. Why are the lungs said to work like a pair of bellows?
9. Why should one not wear tight clothing about the chest or over the diaphragm?
10. How much air is taken in at every breath? How much can the lungs hold when they are taxed to their limit?
11. What is the best way to exercise the lungs?

CHAPTER X

HEALTH HABITS IN SLEEPING

You know that sleep is necessary for good health. Children and grown people who fail to get enough sound sleep soon feel ill-humored and sick.

While awake we are active most of the time. All parts of the body are usually at work. Of course this results in much wear and loss which has to be made up somehow. Whether we are awake or asleep, the body is all the time repairing itself; but while we are active, so much body material is worn out that the mending gets far behind. So there must be regular periods when the body is quiet and in repose, with all its machinery running at very low speed, if it is to catch up with its work of repair.

In the springtime when the sweet peas are beginning to grow in the flower garden, if you will measure a plant early in the morning and again at dusk and then again the next morning, you will find that the plant grew a good deal more during the night than it did during the day. This is true of other plants. During the daytime the plant is busy storing up food from various sources. During the night it uses this material to increase its growth.

This fact is also true of people. Children grow during sleep more than they do when awake. Sleep is thus the best time for growth and repair of the body.

Healthy sleep is sound and dreamless. After a night of such sleep one awakes feeling fresh, rested, and brimful of good spirits. He is ready then to undertake any task. Even the things that looked hard the night before seem easier after a good night's rest. Give instances in your own life to illustrate this.

The best time for sleep is during the darkness of the night. Why should this be so?

The old maxim "early to bed and early to rise" indicates an important health habit. Going to bed late and getting up late is usually not so good a habit because sleep is apt to be interfered with. Everyone must have a certain amount of sleep. The amount we need depends largely upon our age and health. The younger one is, the more sleep he requires. Persons in ill health need more sleep than those who are well. The following program for people of different ages is a good one:

From four to seven years of age, twelve hours of sleep.

From seven to nine years, eleven hours.

From nine to twelve years, ten hours.

From twelve to sixteen years, at least nine hours.

Grown people require from seven to eight hours of sleep.

Going to bed at a regular time each night is a most important health habit. If one forms the habit of going to bed one night at one hour and another night at another hour, he will soon find it difficult to drop off to sleep at once. If one continues such an irregular plan, he is likely to lose much needed sleep, and illness may result. One cannot keep in health without his full allowance of sleep. What is the number of hours which you need to sleep to feel and keep well? At what hour ought you to go to bed to get your full sleep and arise early enough to be ready for school on time?

In the morning, when sleep is ended, we should arise promptly. One who lies in bed and dozes, half asleep, forms a bad habit.

Most persons sleep soundly when they are physically tired. Why is this? A very wise man once said: "The sleep of the laboring man is sweet." Have you observed that those who are active during the day sleep better at night than those who lounge about and spend the daytime in idleness? Why should work and exercise lead to sound sleep? One should not, however, play very hard or engage in exciting games just at bedtime, as this is likely to arouse one so that it will not be easy to get to sleep. The same is true of reading or listening to exciting tales near bedtime.

Perhaps you have noticed that people who eat hearty suppers late at night are likely to sleep poorly and to have bad dreams. Those who use tea, coffee,

or cocoa at supper are generally wakeful at night, for these drinks arouse one, or make one sleepless. Many people are wakeful if they drink coffee, tea, or cocoa at any time during the day. These drinks are also harmful in other ways, as we shall see later.



THIS BEDROOM HAS LARGE WINDOWS ON TWO SIDES, SO THAT PLENTY OF FRESH AIR CIRCULATES THROUGH IT WHEN THE WINDOWS ARE OPENED WIDE. THE CURTAINS, HOWEVER, SHOULD BE DRAWN ASIDE AT NIGHT.

One sleeps best when breathing pure, fresh air. To sleep in the open air is most restful. If one may not sleep out of doors, he at least should get plenty of outdoor air into his sleeping room at all seasons. About one third of one's whole life is spent in sleep. Not to have good air to breathe during so

Fresh air

much of life may injure one's health. Besides, for the body to do its work of repair during sleep in a perfect manner, it needs the help of pure air. If one sleeps in a close, warm room, the body will be unable to obtain this help, and so its work cannot be well done; and one may awake in the morning feeling dull, tired, and cross, and perhaps with a headache. You will remember that in a previous chapter we saw how one can get an abundance of fresh air at night. You should try this plan if possible.

The bed should not be too soft. The old-fashioned feather bed has been justly discarded because it was too soft and tended to overheat the body. It was bad for other reasons, especially because of the difficulty of keeping it sweet and clean. Mattresses made of hair, cotton, wool, moss, or excelsior are healthful and comfortable.

Many people think a pillow is not needed. If one be used, it should be rather firm and not thick and just high enough to bring the head on a level with the body. It should never be high enough to elevate the shoulders. The real use of a pillow is to support the head. The Japanese child who sleeps with a notched block of wood and a tiny cushion placed under his neck has a more healthful support than the big, fluffy cushions we use for pillows. The use of improper pillows is a common cause of round shoulders. You will remember that when one is young the bones easily become crooked. To lie every night with

The question of the pillow

the head too high cramps the chest and may even change the shape of the shoulders.

The most restful and healthful way to lie for sleep is



THE JAPANESE MAIDEN HAS A NOTCHED BLOCK OF WOOD AND A TINY CUSHION FOR A PILLOW.

with the body stretched out at full length, and always on the side, never on the back.

The body must always be comfortably warm during sleep. One cannot sleep soundly if one feels

For health-
ful sleep

cold. Even if the feet only are cold at bedtime, this discomfort may keep one awake. If at bedtime one's feet are cold, he should warm them well. A good way is to put the feet into hot water for five minutes, then



WHAT WILL HAPPEN TO THIS GIRL IF SHE CONTINUES TO LIE IN THIS POSITION?

splash cold water over them, and wipe them dry by rubbing them hard with a rough towel.

The best covering for one while asleep is soft fleece blankets, warm but of light weight. All bed clothes, like all body clothing, should be *porous*; that is, it should allow air to pass through it. When we sleep, as when we are awake, waste and perspiration are being thrown off by the skin. If the air cannot get through to cleanse them, the bed blankets will soon be

filled with this waste. Under such coverings sleep is likely to be restless.

Comforts and quilts filled with cotton make warm coverings, but they are not so healthful as blankets.

Clean beds are necessary for health. My neighbor Janie has been told this so often that she has formed an excellent health habit. Every morning as soon as she is dressed, she places two chairs at the foot of her bed. Then she takes off the covers one by one and throws them loosely over the chairs. She begins with the top one and always takes pains that none of them falls on the floor to get soiled. Then she places the pillows on another chair. This done, she opens wide her windows, shuts the door, and leaves the bedding for the fresh air to cleanse while she goes to breakfast. Each week, on the day when the bed linen is changed, she carries her blankets out of doors and hangs them on the clothesline in the bright sunshine for a few hours to make them fresh and sweet. I need hardly tell you that Janie sleeps more soundly because of the good care she gives to her bed.

REMEMBER: It is during sound sleep that the body is repaired and the mind is refreshed. Growing children need more sleep than adults. People who do hard work need more sleep than those who are idle. It is a bad health habit to eat a hearty meal just before going to bed or to drink coffee or tea, which cause wakefulness. One should always breathe pure, fresh air while he is asleep.

HEALTH HABITS

HEALTH PROBLEMS AND PROJECTS

1. Why does one feel rested after a night of sound sleep? What has taken place in the body during sleep?
2. Do you ever lie awake in your bed at night wishing you could go to sleep? If you do, think over what you did for several hours before bedtime, and see whether you can find the cause of your sleeplessness. Did you drink tea, coffee, or cocoa?
3. Why do those who live in the city like to go out into the country and sleep in a tent or under the open sky?
4. Can one sleep as soundly when lying on the back as when lying on the right side?
5. Can one sleep soundly with knees drawn up toward the chest and with one hand under the head?

REVIEW QUESTIONS

1. Why is sound sleep necessary for good health?
2. When does the repair of the body go on most actively?
3. When is the best time for sleep?
4. Give the rule for the amount of sleep we should have at different ages.
5. Does a person need more sleep when he is ill than when he is well? Why?
6. Should one go to bed at a regular hour every night? Why?
7. What habits may make one sleepless?
8. Should one have fresh air while sleeping? Why?
9. How should one lie while sleeping?
10. How should one's bed be arranged for the most healthful sleep?
11. How should the bed be cared for in the morning?



Donald
Dwight
Donald
Donald

CHAPTER XI

THE FOOD LABORATORIES AND THE TEN "GATES"

Wood, glass, steel, and other materials are needed to build a house or a ship. So certain materials are needed to build our bodies. These building materials we obtain chiefly from our food. Our bodies are made up of what we eat. If one eats poor food, he will not grow properly, and he may become ill or feel half sick all the time. Wrong habits of eating are the cause of more sickness than any other one thing. To keep well, and to accomplish the most, we must choose good foods, cook them well, and prepare them in the mouth properly for our needs.

Our bodies are in some respects like engines. For one thing, they are always wearing out and needing to be repaired. So material is required for repairs in the body, as well as for building. How does an engine obtain the energy which enables it to pull a train? How does the body get the energy which it needs for work and play? If you put your hand into cold water, it will soon become cold, but when it is removed it quickly becomes warm again. This is because the food we eat is burned in the body, and in this way we are kept warm. Food furnishes the fuel.

Building
material
for the
body

The body
resembles
an engine

Food supplies the following needs of the body:

1. *Building material.*
2. *Energy, or power for play or work.*
3. *Heat, to warm the body.*

Very few foods contain just the right amount of each kind of food material. Some, as eggs, beans, cheese, and meat, contain building material, or *protein*, principally, while others, such as butter and sugar, contain only energy and heat-making material—*fats* and *carbohydrates*. So we need to eat a variety of articles, such as bread, butter, milk, eggs, vegetables, and fruits, in order that the body builders may be able to get plenty of each kind of material needed.

The kinds of food material It is highly important that the bill of fare should be properly balanced; that is, that it should contain the proper amount of each food element to make good the daily losses of the body and to provide the necessary heat and energy and a sufficient amount of *cellulose*, or *roughage*, to enable the body promptly to dispose of its wastes.

Children need more food in proportion to their size than do grown people, because their bodies are being built. They need material for making bones and muscles and for all the growing organs. Still, children very often overeat.

In converting food into muscles, bone, and other tissues, we can consciously do but little. We can put it into our mouths, grind it with our teeth, and swallow it.

FOOD LABORATORIES AND TEN "GATES" 101

The body must do all the rest. But we can help or hinder the work in many ways.

One way in which people often hinder the body's



CHILDREN NEED THE KINDS OF FOOD THAT MAKE BONES AND MUSCLES, AND MUST HAVE MORE SUCH FOOD IN PROPORTION TO THEIR SIZE THAN DO GROWN PEOPLE.

work is by *eating too fast*. Food as it is put into the mouth is not in condition to be used by the body. All of it has to be dissolved and made into liquid form before it can be used in the body. The process by which this is done is called *digestion*.

The work
of digestion

The organ in which this work is carried on is a long tube, or food *canal*, as it is called, which begins with the mouth. If laid out straight and measured, this canal would be about thirty feet long. In some parts it is narrow, while in other places it is much wider. Some parts of the tube are straight, other parts are coiled. At different points along the canal are *laboratories* in each of which some special work is done, until all material that is good for the body's use has been separated out of the food and sent into the blood.

There are five food laboratories, the *mouth*, the *stomach*, the *small intestine*, the *liver*, and the *colon*.

Five food laboratories Each of these laboratories does something special to the food.

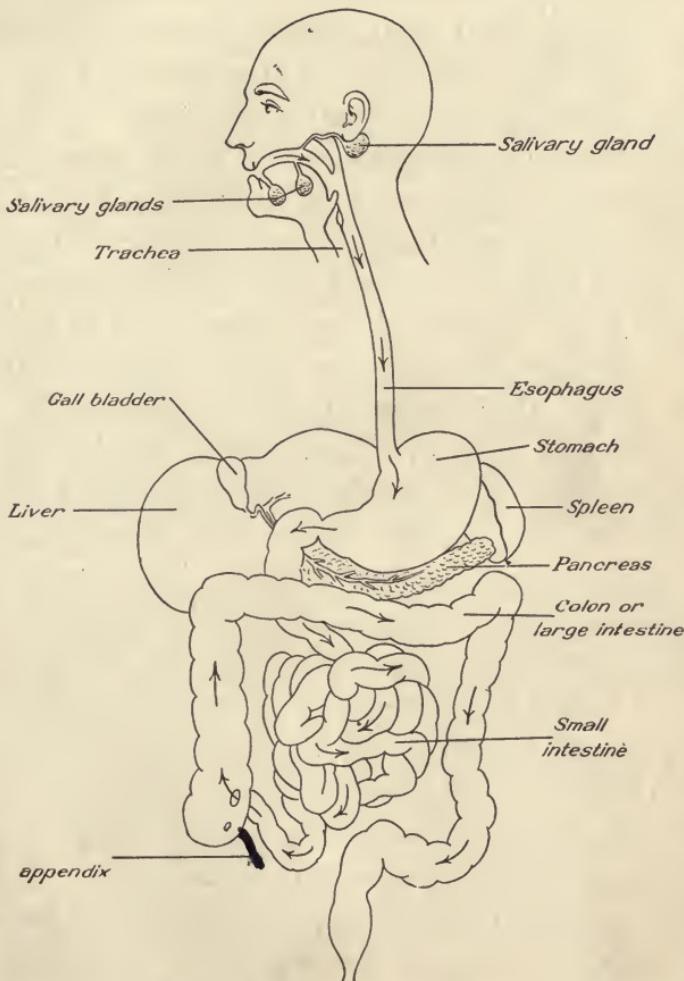
i. The mouth laboratory The mouth laboratory contains a mill for grinding the food by chewing it. Close by the mouth are *salivary glands* which produce *saliva*; this moistens and dissolves the food and converts starchy foods like bread into sugar. You must have noticed that a crust of bread becomes sweeter the longer it is chewed.

The longer the food is chewed, the more saliva will be mixed with it, and the more sugar will be produced. The saliva acts upon the food not only while it is in the mouth but also for about an hour after it has been swallowed.

When food is well chewed, the organs of taste can do their work thoroughly, and taste thus enables us to make a good selection of foodstuffs and to determine the quantity of food we need as well as to judge of its quality.

If the food is not well chewed, the work of the stomach laboratory is disturbed.

Have you ever suffered from a *sour* stomach? If so,



THIS FOOD CANAL DOES MORE REMARKABLE WORK THAN DOES ANY OTHER KIND OF CANAL YOU EVER HEARD OF. NOTE THE VARIOUS LABORATORIES.

it was probably due to the fact that you did not chew your food sufficiently.

In the stomach laboratory there is an acid juice which begins the work of digesting the *albumens* (white of egg, lean meat, brans, cheese, and the like); but the work is not completed here. The stomach only prepares the food for the more complete digestion effected in the small intestine.

The stomach, then, may be compared to a kitchen in which food is made ready to serve in the dining room.

The small intestine is the great food laboratory of the body. It might be called the dining room of the body, for here the digestion of the food is completed.

3. The
chief food
laboratory Here also are about five million *villi*, which extend into the food mass in the intestine like short hairs and absorb the digested foodstuffs. Each of the villi absorbs about two tablespoonfuls of liquid in a lifetime of sixty years. They are like the rootlets of a tree. They suck up the liquid nourishment provided by the digested foodstuffs, which may be compared to the soil that surrounds the roots of a plant.

In the small intestine the food is acted upon by the *bile* from the liver, the *pancreatic juice* from the *pancreas*, and the *intestinal juice*, which together digest all the substances found in our natural foodstuffs.

4. The
liver labo-
ratory In the liver laboratory the work of preparing the food for use is completed. The liver does so many things to the food that one cannot mention them all. Besides aiding in the digestion of

all the different food elements, the liver laboratory destroys poisons or makes them unable to produce deadly effects by taking away from them their poisonous qualities.

Every large city has a waste plant where all kinds of refuse are received and burned or otherwise disposed of. The colon or large intestine is the waste-disposal system of the body.

The food leaves the stomach about four hours after it is eaten. In four hours more, digestion and absorption are finished and the unusable remainder has reached the middle of the colon. The food has traveled about twenty-seven feet in eight hours. The remaining distance to the end of the food tube is about three feet. At the same rate, how long a time should the food require to travel this short distance?

The X-ray shows that the useless food substances left after digestion, instead of being dismissed from the body within a few hours, are sometimes retained fifty hours or more, which is harmful to health.

When the waste substances are thus held for many hours in the colon, they begin to decay. Harmful materials may be absorbed into the blood and produce a sort of poisoning, or *auto-intoxication*. This is the most common cause of headache, a "coated" tongue, a "bad" breath, loss of appetite, a muddy complexion, and many other unpleasant and unhealthful conditions.

5. The
refuse
laboratory

The diges-
tive time-
table

How the
body be-
comes
poisoned

The colon ought to be cleared of refuse at least once every day; twice or three times would be better. The bowels in a healthy person should move regularly. If they do not, more roughage is needed in the shape of "greens" or bran, coarse vegetables, and whole grain foods, such as oatmeal. The hardy Scotch Highlanders live largely on *brose*, or oatmeal porridge, which makes excellent food for bones and muscles and is likewise a good tonic for the bowels. Sometimes *lubrication*, or oiling, is needed. Then a large spoonful of mineral oil may be taken at each meal.

The study of the food tube, or canal, after a test meal by means of the X ray has shown that the food does not move along the canal at a regular rate but by stages, making long or short pauses at various points. These pauses are controlled by "gates," which hold the food at various points as it is moved from one laboratory to another, while the different kinds of work needed in digestion are being completed one after another.

Let us now learn about each of these ten "gates."

The mouth admits the food and so may be called the *food dictator*. We are responsible for our food while it is in the mouth and for the selection of our food. After food is swallowed, we have no control of it; so we should take care to put nothing in the mouth which can harm us in any way. And we should take good care of our mouths so that clean food will not be soiled by contact with an unclean mouth.

1. The food
dictator's
gate

The *soft palate* and the *folds* at the back of the throat inspect the food to find whether it has been properly chewed and is otherwise suitable to be swallowed.

2. The inspector's gate

The upper end of the food tube — the *gullet* or *esophagus* — is closed except when food or drink is being swallowed. Just in front of this is the air gate, which leads to the lungs.

3. The food and water gate

At the lower end of the gullet where it joins the stomach is a muscular ring which guards the entrance to the stomach. This gate opens when food is being swallowed but is closed at other times.

4. The stomach gate

The bowel gate is closed during digestion, opening at short intervals to permit the partially digested food to pass into the intestine in small quantities.

5. The bowel gate

When the stomach is empty, strong contractions occur which produce the sensation of hunger. Very violent contractions give rise to pain.

A muscular ring at the lower end of the small intestine holds back the food until digestion and absorption are practically complete. This gate then opens at intervals to allow the food remains to pass through into the colon.

6. The control gate

This gate is a check valve which prevents the substances that have entered the colon from passing back into the small intestine. When the colon is allowed to become loaded with refuse, this

7. The colon gate

valve may be unable to act, and the waste matters of the colon may pass back into the small intestine.

At about the middle of the colon, movements called *peristaltic waves* pass in both directions — back toward the entrance and forward toward the exit.

8. The reversing valve

This arrangement prevents the immediate discharge of the liquid material from the small intestine. The contents of the intestine become concentrated and are then pushed along toward the exit.

The next gate consists of a loop of colon which receives the waste substances and, when they have accumulated in sufficient amount, discharges them. When this loop of the intestine is empty, it falls down low in the cavity of the trunk. As it fills, it gradually rises and on reaching a certain point discharges its contents.

9. The discharging gate The last gate is always closed except when open to permit the discharge of waste matter.

There is such a wonderful unity between the different laboratories and gates of the food tube that, when work begins in one laboratory, all the rest prepare for work; and when there is a stoppage at one gate, the gates above, or leading to it, close tightly so as to prevent increase of trouble at the obstructed gate.

How the digestive machinery works together

When people suffer from indigestion, it is because there is disorder or trouble in some one or more of the laboratories or at one or more of the gates.

Did you ever have indigestion? In which laboratory

was the trouble, do you think? Which gate refused to close or to open?

Did you ever vomit? Do you think the food would come up from the stomach if the bowel gate were open so that food could pass down?

Here is a table which shows the time required in a healthy person for an ordinary meal to pass through all the gates and the whole length of the food tube:

THE DIGESTIVE TIME-TABLE

	BREAKFAST
Mouth	8:00 A.M.
Stomach, empty	12:00 NOON
Small intestine, empty	4:00 P.M.
Colon, waste matter ready to be discharged	10:00 P.M.

The taste of food in the mouth is a signal to the stomach to get ready to digest the food that is coming. In turn the word is passed along to every laboratory until all are in readiness for service.

REMEMBER: Our food is prepared in the body for our needs in a wonderful series of laboratories. We can assist the work of the laboratories by choosing our food wisely, by cooking it properly, and by chewing it thoroughly.

HEALTH PROBLEMS AND PROJECTS

1. Think of some clear and convincing way to show to a person who does not understand the matter that the food one eats is made into bones, muscles, hair, skin, lungs, and other organs.

2. Think of some clear and convincing way to prove that the food one eats warms the body and supplies the energy we need for our work and play.

3. Think of a good way to show that the body needs and uses heat and energy even when one is not engaged in work or in play but is sitting quietly in a seat.

4. Show that the terms "laboratories" and "gates" as used in this chapter are appropriate terms to use.

5. In the diagram of the food canal on page 103, show where each of the five food laboratories and each of the ten gates is situated. Number each laboratory and gate and tell just what it accomplishes in the work of digestion.

REVIEW QUESTIONS

1. How is building material for the body secured?
2. Why are our bodies somewhat like machines?
3. What five needs of the body does food supply?
4. What are the several kinds of food materials?
5. What is meant by a "balanced bill of fare"?
6. What is *digestion*?
7. What is the *food canal*?
8. Mention each of the five food laboratories, and tell what work is accomplished in each one.
9. Mention each of the ten "gates," and tell what each is used for in the food canal.
10. How does the digestive machinery work together?
11. Give the digestive time-table.

CHAPTER XII

HEALTH HABITS IN EATING

WHEN a person eats very fast, the food is swallowed before it can be crushed into fine pieces, and then the labora- Health
tories rules in
along the eating food canal have a hard time dissolving it.

Try this experiment: Take two glasses of water. Put a few hard lumps of sugar in one and a spoonful of fine sugar in the other. Which dissolves first? What you find true of the sugar is true of our food. The finer the particles into which



IS IT A GOOD HEALTH HABIT TO WASH DOWN FOOD BEFORE IT IS CHEWED?

food is divided before it is swallowed, the more readily it is digested.

One way, then, in which we can help the body in its **I. Eat slowly** work is to *eat slowly* and to chew every morsel of food until it is fine before swallowing it.

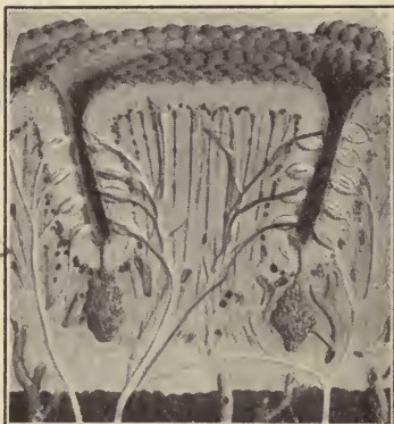
Some experiments that have been made have proved that two thirds of a pound of food well chewed will supply the needs of the body as well as a whole pound of the same food when eaten too rapidly. What is the reason?

Did you ever look at your tongue in a mirror? If so, you must have noticed that its surface is covered with little points, some of them larger than others. These points are sometimes called *taste buds*, because it is by means of them that we are able to taste the different flavors in food and other substances that we put into our mouths. One curious fact about these taste buds is that those which tell sweet tastes are on the tip of the tongue. Buds for other tastes are located on the side of the tongue, while we taste bitter substances on the back of the tongue. If our tongues are coated and "furred," the taste buds do not work well, and our food seems to have no taste, so that we do not enjoy eating. These taste buds were meant to give us pleasure while we eat. But if we hurry through our meals, swallowing our food almost as soon as we get it into our mouths, we miss most of the taste and spoil Nature's plan for our pleasure, besides doing ourselves an injury.

When people eat fast, they are very likely to eat too much. The laboratories of the food canal are able to do only a certain amount of work. When too much food is eaten, not any of it can be as well digested as it ought to be. If food is not well digested, then, of course, it does not make good material for building or warming the body or keeping it fit for play or work.

Do you think one should ever eat until he feels stuffed?

How much one ought to eat depends upon his size, his age, the work he does, the climate, whether he lives indoors or outdoors, whether he is active or idle, and upon other conditions.



ALL TASTES AND FLAVORS DEPEND UPON THE ACTION OF "BUDS" ON THE TONGUE. NOTE WHERE THE BUDS FOR THE DIFFERENT TASTES ARE LOCATED.

Three meals each day are quite enough for boys and girls who are in good health. These ought to be eaten regularly; that is, at the same hour every day. 2. Eat regularly
If we eat our breakfast every morning at seven o'clock, dinner at one o'clock, and supper at six, the body is on the lookout for food at those hours and has everything all ready in the stomach to receive it and make use of it. If, however, one gets so interested in his play that he comes to dinner an hour or two later than usual, then when he swallows his food

the stomach is taken by surprise. If one is careless and eats his meals at different hours each day, he is likely to upset Nature's orderly plan, and illness may follow.

When children wait to take extra naps after they have been called in the morning, it often happens that they have time only to eat a few mouthfuls hastily before going to school. This too interferes with Nature's plan. It is very likely that not enough food is eaten or that it is swallowed without giving the taste organs time to do their work thoroughly and that, therefore, the body does not have enough material for all its needs.

You know your food is used to make blood and that the food has to be ground into pieces and change a great deal before it is ready for use. After you have eaten a meal, it takes the stomach four or five hours to care for the food. Sometimes it takes even longer according to the things you have eaten, for it is a good deal harder to digest some foods than others. Do you know what foods you can digest most quickly? What foods require a long time to digest?

If we eat anything an hour or two after breakfast when the work of changing the food is well under way, the workers, instead of being able to keep on working until their part in digesting the breakfast is finished, have to start again at the very beginning of the process of digesting the new food that has been eaten. So it may happen that the breakfast

3. Give the digestive organs rest

material is kept in the stomach much longer than it should be, and too much acid is developed, causing a sour stomach.

If you have eaten too little food at a meal and feel hungry before the next meal, you may eat an apple or an orange or some other simple fruit; but cookies, candy, bread and butter, and similar foods should be avoided. Fruits, if ripe and if well chewed, give the stomach very little work to do, because they are already cooked and digested in the sun and contain foods ready for the body to use; for this reason ripe fruits do not tax the digestive organs heavily.

When the stomach is abused, it becomes unable to digest, and then we *lose appetite*. Pain in the stomach, vomiting, and sick headache are some of the ways in which the stomach complains when it has been abused. We never feel the working of a healthy stomach.

The stomach, besides needing rest after each meal, needs also to rest at night while we sleep. Hence we should avoid eating food late at night. If one goes to bed with a stomach full of food, the stomach will act very lazily, just as people work very slowly when they are sleepy. Besides, one's sleep is likely to be much disturbed by dreams, and one may awake in the morning without feeling refreshed.

4. Avoid
late eating

Recent studies of digestion have shown that the stomach needs to become completely empty for a little time before each meal to enable it to get ready for the next meal.

Again, the food workers cannot serve us well when the body is very tired. When we have been exercising ^{5. Rest before eating} very hard at work or play, we should rest for a little while before eating. Why is this a good health habit?

It is best to avoid eating too many different kinds of food at one meal. The food workers can take care of ^{6. Secure daily variety} three or four different foods more easily than they can a dozen kinds. We need to eat a wide variety of foods, but it is better to have this variety from day to day than to have it all at one meal.

A wise man once said, "We should eat to live, not live to eat." Do you think that everyone should learn

^{7. Eat nourishing food} to choose foods that nourish the body, rather than such as merely please the taste? Why?

Sometimes children injure their health greatly by eating only the pie or pudding and other relishes on the table, leaving the bread and butter, potatoes, and other wholesome foods untouched.

There are very degraded tribes of human beings living in certain parts of South America who consume considerable quantities of clay, eating lumps of it as you and I eat bread. Do you think that clay is of any benefit to them? Certainly not. They are greatly injured by it. Some children form the habit of eating chalk, pencils, and similar indigestible things. This is a very bad habit indeed. It is about as bad a habit to eat mustard, pepper, pepper sauce, horse-radish, and spiced pickles. These condiments have no more food value than

SWEETS

Constant indulgence in sweets
(especially between meals)

Impairs the appetite

Ruins the digestion

Decays the teeth

Lays the foundation for sickness in later life



Tommy had a tummy which he stuffed with lollipops,
Chocolate and soda, taffy and gum-drops.

Tommy has dyspepsia now, Bright's Disease and gout.
"And the Gobble-uns 'll git you, ef you don't watch out!"



Said dapper Mr. Date to dried but sweet Miss Fig.
"Why is it Master Sammy is so healthy and so big?"
Said she "Upon cheap goodies, he never spends his money;
He loves raisins, figs and dates maple sugar and pure honey."

clay, and they are even worse because they contain substances which are highly injurious so that they harm the delicate organs with which they come in contact. For this reason condiments and hot sauces of all sorts are usually harmful. They not only injure the stomach,



OF COURSE MARY HAS NO APPETITE, AND "DOES NOT FEEL VERY WELL."

but they also damage the liver and kidneys and tend to cause *hardening of the arteries* and other ills.

It is highly important that our foodstuffs should be carefully chosen. One should not choose in a haphazard way, eating any food that is at hand or any kind that may be presented to him.

8. Food should be chosen carefully

We should remember that our bodies are made of what we eat. If we wish to have strong and

healthy bodies, we must take good care to secure the best building material.

Most of our foods come from the vegetable kingdom, the original source of all food. The animals feed upon plants directly, or indirectly by eating other animals which have been nourished by plants.

Recent experiments have shown that it is necessary, as a rule, to make use of all parts of food plants in order to secure all the substances necessary for building our bodies and keeping them in health. Animals which feed upon seeds only show evidence of ill health. The same is true when roots are made the exclusive diet. Seeds, roots, and green leaves or tender shoots all must be eaten to furnish everything needful; and for safety, milk should be added. Green leaves and such articles as celery, lettuce, and the like are highly essential foods. Spinach or some other greens should be eaten daily in liberal amounts.

We must eat all parts of food plants

Some animals are so organized that they can live exclusively on meat. It is noticeable, however, that these animals do not thrive upon only the soft parts of animals. They must eat the bones as well, for bones contain *lime* which is necessary for keeping in health not only the bones but also the fleshy parts of the body. The muscles do not work well without lime; the heart becomes feeble, and the blood also suffers loss. Hence the bones must be eaten along with the soft parts. In other words the whole

Meat-eating animals

animal must be consumed to make nutrition complete. We cannot do this because we are not naturally adapted to such a diet. Some persons who eat largely of meat are much injured by so doing. In eating meat we may get more protein than we need unless we are quite sparing in its use. The excess will be a burden to the body. Some portion will undergo decay in the colon, thus causing poisoning of the whole body. When one eats much meat, the work of the kidneys is increased because they must remove the poisons from the blood. It is for this reason that doctors forbid the use of meat to patients suffering from diseased kidneys. Do you not think it a wise thing to begin to take care of the kidneys while they are healthy so as to keep them from becoming diseased?

Every child should have a quart of milk daily; if he has this amount, he does not need much if any meat and is usually better off without it.

We must have a balanced bill of fare

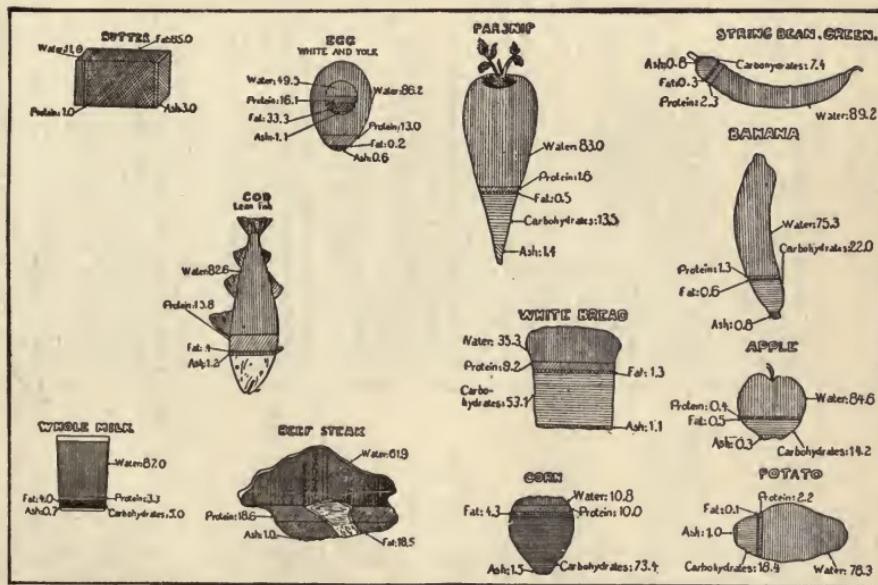
Physiologists have shown that human beings cannot thrive upon a diet consisting mainly of foods like lean meat, beans, cheese, or other proteins, together with butter, cream, or other fats. A suitable amount of starch foods, like white bread or potatoes, and especially leafy vegetables, such as cabbage, spinach, lettuce, beet greens, and the like are absolutely necessary. For the best health a *balanced* bill of fare is essential. Such a bill of fare consists of about ten per cent protein, which we should get chiefly from bread, beans, peas, milk, meat,

eggs, and cheese, thirty per cent fat, and sixty per cent starch.

In the sample meals given on pages 122 and 123, which have been prepared by specialists for the United States Government, you can see how each meal can be planned so as to include the right amounts of proper foods.

For the younger children more milk and less meat should be used. Milk is a good substitute for meat for everyone of any age.

Sample
meals to
suit the
seasons



COMPOSITION OF SOME OF THE COMMON FOODS.

SAMPLE SUMMER DIET FOR CHILDREN 7 TO 12 YEARS

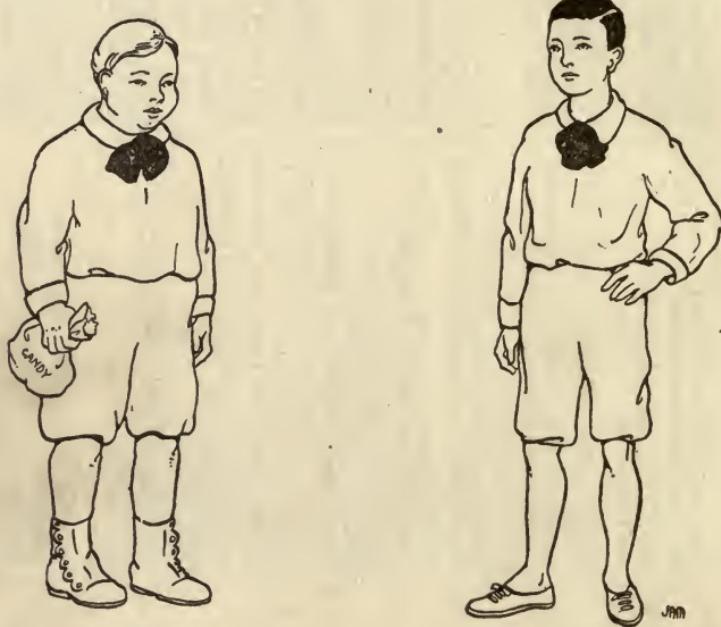
BREAKFAST	DINNER	SUPPER
Oatmeal $\frac{1}{2}$ to $\frac{3}{4}$ cup, with milk Stewed fruit, 2 to 3 tablespoonsfuls Bread and butter, 2 to 3 slices Milk to drink, 1 glass	Lamb stew, with vegetables, small portion Squash or string beans, 2 to 3 tablespoonsfuls Bread and butter, 2 to 3 slices Bread pudding, 2 tablespoonsfuls	Potato soup, with milk, 1 cup Poached egg on toast Brown bread and butter, 2 to 3 slices Stewed prunes, 4 to 5 Milk to drink, 1 glass
Forge or corn flakes, 1 cup, with milk Egg Brown bread and butter, 2 to 3 slices Milk to drink, 1 glass	Chicken with rice, small portion Mashed potato, 2 to 3 tablespoonsfuls Dandelion greens, or boiled onions, 2 to 3 tablespoonsfuls Stewed fruit, 2 to 3 tablespoonsfuls Bread and butter, 2 to 3 slices	Spinach soup, with milk, 1 cup Corn bread and syrup, 2 to 3 pieces Cottage cheese, 1 level tablespoonful Ginger cookies, 1
Hominy, $\frac{1}{2}$ to $\frac{3}{4}$ cup, with milk Toast and butter, 2 to 3 slices Baked banana, 1 Milk to drink, 1 glass	Bacon, 1 slice Poached egg and spinach Spaghetti with tomato sauce, 2 to 3 tablespoonsfuls Green peas or string beans, 2 to 3 tablespoonsfuls Bread and butter, 2 to 3 slices	Corn flakes, 1 to 2 cups, with milk Puree of lima beans, $\frac{2}{3}$ cup Ginger cookies, 1 to 2 Milk to drink, 1 glass
Corn meal, $\frac{1}{2}$ to $\frac{3}{4}$ cup, with syrup Scrambled eggs, 1 Bread and butter, 2 to 3 slices Milk to drink, 1 glass	Rice pudding, 1 to 2 tablespoonsfuls Hamburg steak, 1 small ball Stewed potatoes, 2 to 3 tablespoonsfuls New beets and beet-top greens, 2 to 3 tablespoonsfuls Stewed fruit, 2 to 3 tablespoonsfuls Bread and butter, 2 to 3 slices	Milk toast or rice, $\frac{1}{2}$ cup, with milk Baked potato, 1 Bread and butter, 2 to 3 slices Milk to drink, 1 glass
Shredded wheat 1, with milk Corn bread and butter, 2 pieces Apple sauce or stewed pears, 2 to 3 tablespoonsfuls Milk to drink, 1 glass	Fish or clam chowder, $\frac{1}{4}$ cup, or egg New beets or spinach, 2 to 3 tablespoonsfuls Boiled potato Bread and butter, 2 to 3 slices Custard or junket, $\frac{1}{2}$ cup	Oatmeal soup, 1 cup Squash, chard, or carrots, 2 to 3 tablespoonsfuls Stewed fruit, 2 to 4 tablespoonsfuls Bread and butter, 2 slices Milk to drink, 1 glass Plain cookies, 1
Forge or corn flakes, 1 to 2 cups, with milk Poached egg on toast Brown bread and butter, 2 to 3 slices Milk to drink, 1 glass	Lamb hash or veal cutlet, small portion String beans, 2 tablespoonsfuls Baked potato Bread and butter, 2 to 3 slices Apple sauce, 2 to 4 tablespoonsfuls	Rice and milk, $\frac{2}{3}$ cup Corn bread and butter, 2 slices Ginger cookies, 1 to 2 Milk to drink, 1 glass
Rice, $\frac{1}{2}$ cup, with milk Bread and butter, 2 to 3 slices Stewed fruit, 2 to 3 tablespoonsfuls Milk to drink, 1 glass	Dried pea or bean soup, 1 cup Baked potato Bread and butter, 2 to 3 slices Lima beans or new beets, 2 tablespoonsfuls Ice cream or fruit sherbet, 2 tablespoonsfuls	Baked potato, 1 Poached egg on toast, 1 Stewed prunes, 4 to 5 Plain cookies, 1 to 2 Milk, 1 glass

SAMPLE WINTER DIET FOR CHILDREN 7 TO 12 YEARS

BREAKFAST	DINNER	SUPPER
Oatmeal, $\frac{2}{3}$ cup, with milk Bread and butter, 2 to 3 slices Baked apple, 1 Milk to drink, 1 glass	Roast lamb, small slice; baked potatoes Beets, onions, or oyster plant, 2 to 3 tablespoonfuls Rice pudding, 2 to 3 tablespoonfuls Bread and butter, 2 to 3 slices	Scrambled egg, 1 Bread and butter, 2 to 3 slices Oatmeal cookies, 1 to 2 Milk to drink, 1 glass
Hominy, $\frac{2}{3}$ cup, with milk Bread and butter, 2 to 3 slices Bacon, 1 slice Cocoa with milk, 1 cup	Vegetable soup with carrots, beans, onions, 1 cup Spinach with poached egg, ¹ 2 to 3 tablespoonfuls Corn bread and butter, 2 to 3 slices Dates, 4 to 5	Baked potato, 1 Bread and butter, to 3 slices Stewed apricots, 2 to 3 tablespoonfuls Cottage cheese, 1 tablespoonful
Corn meal, $\frac{1}{2}$ to $\frac{2}{3}$ cup, with milk Toast and butter, 2 to 3 slices Apple sauce, 2 to 4 tablespoonfuls Milk to drink, 1 cup	Rice and meat loaf, small portion Stewed celery or cauliflower, 2 to 3 tablespoonfuls Bread and butter, 2 to 3 slices Baked Indian pudding, 1 tablespoonful	Rice and milk, $\frac{1}{2}$ cup Baked banana, 1 Fruit cookies, 1 to 2 Bread and butter, 3 to 4 slices
Oatmeal, $\frac{2}{3}$ cup, with milk Bread and butter, 2 to 3 slices Stewed prunes or figs, 3 to 4 Cocoa with milk, 1 glass	Beef stew with vegetables, small portion Bread and butter, 3 to 4 slices Rice pudding or custard, 2 to 3 tablespoonfuls	Corn bread and syrup, 2 to 3 pieces Soft egg Bread, 2 to 3 slices, and peanut butter, $\frac{1}{2}$ tablespoonful Cocoa with milk, 1 glass
Force or corn flakes, 1 to 2 cups, and milk Bread and butter, 2 to 3 slices Soft egg and bacon, 1 Milk to drink, 1 glass	Chicken, small slice; potato soup with milk, 2 to 3 cups Creamed carrots or onions, 2 to 3 tablespoonfuls Ginger bread and thin cream, 1 small piece Bread and butter, 2 to 3 slices	Milk toast, 2 to 3 slices Cottage cheese, 1 tablespoonful Stewed prunes, 4 to 5 Cookies; milk to drink, 1 glass
Pettijohn or malt breakfast food, $\frac{2}{3}$ cup, with milk Bread and butter, 2 to 3 slices Soft egg; milk to drink, 1 glass	Creamed or fresh broiled fish, small portion Baked sweet potato, 1 Bread and butter, 2 to 3 slices Baked apple, 1	Spinach or bean soup, 1 cup Baked potato, 1 Corn bread and butter, 2 pieces Milk to drink, 1 glass
Corn meal, $\frac{2}{3}$ cup, and milk Toast and butter, 2 to 3 slices Stewed dried peaches, 2 to 3 tablespoonfuls Cocoa with milk, 1 cup	Lamb stew with vegetables, small portion Boiled potato, 1 Bread or rice pudding, 2 to 3 tablespoonfuls Bread and butter, 2 to 3 slices	Celery soup with milk, 1 cup Bread and butter, 2 to 3 slices Custard or junket, $\frac{1}{2}$ cup Ginger cookies, 1 to 2; milk to drink, 1 glass

¹ Toward spring, when eggs are abundant, they may be eaten more frequently, replacing some meat and milk. Cottage cheese should be made at home or the best grade purchased and used only when fresh.

REMEMBER: Anyone who wants to get the most out of life must eat slowly and chew his food thoroughly so that he may enjoy its taste completely and prepare it fully for the laboratories farther down in the food canal. He must give these laboratories time to rest. He must



IF THESE BOYS SHOULD HAVE A CONTEST IN RACING, WRESTLING, BOXING,
OR DOING ANY KIND OF WORK, WHICH WOULD WIN? WHY?

not eat between meals. He must have his meals regularly. He must not make a meal of cake or pie alone, just because he likes it. He must not eat until he feels stuffed. He must not eat when he is very tired. He must not wash his food down with drink. He must not eat highly seasoned food. He must eat sufficient bran,

greens, fresh fruits, and vegetables to cause the bowels to move freely. He must not eat meat to excess; but grains, like wheat, corn and oats, eggs, milk, greens, fruits, and vegetables must make up his bill of fare almost entirely.

HEALTH PROBLEMS AND PROJECTS

1. How long does it take you to eat your breakfast? Your luncheon? Your dinner? Is this long enough to get all your food into proper condition before it is swallowed?
2. Who enjoys his food the more while he is eating it, the person who swallows it unchewed or the one who chews it thoroughly? Explain.
3. Why does nothing taste good when one has a coated tongue? What do you think nature intended that one should do when he has a coated tongue?
4. Will it be better for one's health if he talks about pleasant things at the table than if he talks about disagreeable things or if he gets angry? Why?

REVIEW QUESTIONS

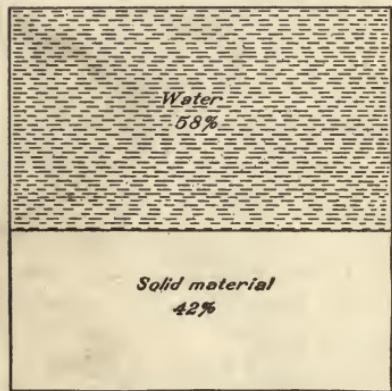
1. Why is it necessary to chew food thoroughly?
2. What are the *taste buds*? Where are they located?
3. How often should one eat during the day?
4. Why should one not eat candy, cake, and such sweet foods between meals?
5. Why do the food workers need to have rest?
6. Is it well to eat heartily immediately after hard work or play? Why?

CHAPTER XIII

HEALTH HABITS IN DRINKING

If you wet your handkerchief in water and lay it aside in the open air, you will find that after a time it will have become dry.

When you sit for a time in a hot room, your lips become parched, and your skin feels dry. The heat has made the air thirsty, and the air is trying to get moisture from your body.



MORE THAN ONE-HALF THE BODY IS COMPOSED OF WATER. THE SHADED PART OF THE PICTURE SHOWS THIS.

Although the body is more than half water, it is all the time losing moisture of the body so rapidly that one needs to drink often to make up for the loss. The body needs water also to supply the fluids which digest the food we eat. Some of the fluids of the body help to carry the digested food

where it is needed. Another use of water in the body is to dissolve and wash out the waste products that are continually forming. These waste matters are

poisonous, as you have learned, and, if they are not expelled from the body promptly, illness will result.

The body shows its need for drink by a "dry," or "thirsty," feeling, just as it shows when it needs food by the feeling of hunger.

The best drink is pure water. Water is, in fact, the only drink which will really quench thirst. That other drinks afford relief from thirst is due to the water they contain.

Fruit juices, orangeade, and lemonade are mostly water. These are wholesome drinks. Tea, coffee, wine, whisky, and beer are also largely composed of water; but the last three contain harmful substances and should not be used. Even tea and coffee may cause injury when habitually used.

Most people do not drink enough water. It is rarely that one drinks too much of it. Many people drink a great deal of tea, coffee, and such liquids but not enough of pure water. Tea and coffee both contain in small quantities a substance known as *caffeine*, which when undiluted is so poisonous that it takes but a very small amount to kill a rabbit.

Caffeine affects the nervous system. It causes sleeplessness and nervousness in the case of many persons, who would be better off to avoid its use entirely. Coffee and tea, when used excessively, may cause indigestion and harm the body in other ways. Cola drinks contain caffeine and may be injurious for the same

Pure water
the neces-
sary drink

reasons. Those who wish to preserve their good health and live long, useful, and comfortable lives must avoid harmful drinks.

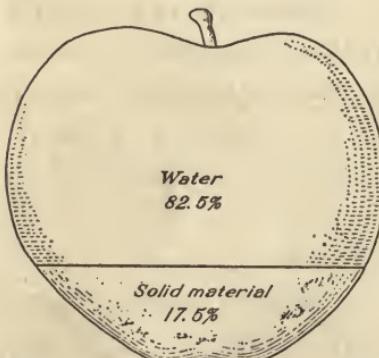
A grown person needs from four to five pints (8 to 10 glassfuls) of water every day. Just how much of this he must drink depends upon the kind of food he eats.

Much good water is stored away in fruits and green foods; and those who make free use of these gain in

this way a considerable part of the water their bodies need.

People who eat a great deal of meat and hardly any fruit need to drink much more water. Why?

All meats contain waste substances like those of our own bodies, and for this reason they increase the work of the organs that get rid of wastes, like the liver and kidneys. You see, then, why



PEOPLE WHO EAT MUCH FRESH FRUIT DO NOT NEED TO DRINK SO MUCH WATER AS THOSE WHO EAT BUT LITTLE FRUIT. YOU SEE FROM THE TOP SECTION THAT OVER THREE FOURTHS OF AN APPLE IS WATER.

more water must be taken when much meat is eaten than when one lives mainly on milk, eggs, grains, and vegetables.

Good habits in drinking

While we should drink freely of water, it is better to form the habit of taking small quantities often, rather than a large quantity at one time.

Usually a person should not drink more than one glassful at a time.

If the water is very cold, it should be taken in small sips. This should be done with any very cold drink or food. Why?

When one drinks water during a meal, it should be taken only after the food in the mouth has been swallowed. If food is half chewed and washed down with drinks of any sort, it will not have so good a chance to be digested as when it is thoroughly



WOULD YOU CARE TO DRINK FROM THIS PUMP?

chewed and moistened by the juices in the mouth.

We should drink only *pure* water. The fact that water is cool, clear, and sparkling is not a sure sign that it is pure. We must know its source in order to determine whether it is safe to drink. A pleasant

taste and appearance are not sufficient. Why can we not always detect impure water by its taste or its appearance?

Water which comes from near the top of the ground is generally impure, because it contains impure substances that soak into it from the soil. Filth pure water is often emptied upon the ground, or buried to drink just below the surface. When the rains come, they wash much of this through the soil into the underground sources of water.

Wells dug in the ground usually furnish water of this sort. Such water is likely to cause, to those who drink it, typhoid fever or some other serious disease.

When we are not sure that water is pure, we may make it safe by boiling it for fifteen or twenty minutes. Boiling the water will give it a "flat" taste, but its original flavor may be restored by pouring it many times from one vessel into another through a colander so as to expose it to the air. It is always



PUTTING AIR INTO WATER AFTER IT HAS
BEEN BOILED.

wise when there is any doubt about the purity of water to boil it and then to store it in corked bottles or fruit jars in the ice chest.

Deep artesian wells usually furnish clean water. Rain water as it falls from the clouds is pure, but it may fall upon a dirty roof, or it may be soiled by the soot and dust which it collects from the air.

Ice which is cut from lakes or rivers is often not pure. Unless ice is known to be from a pure source, it should never be put into water or other drinks to cool them. If we need to make water cold, it can be done best by placing the vessel containing it on ice and by packing ice around it.

If we think a water supply is not good, we should have it tested by an expert. But we can first try the following test: Fill a two-ounce bottle nearly full of the water. Add a small lump of pure white sugar. Cork the bottle and leave it in a warm place. If the contents become clouded within a few days, it is of very doubtful quality and should not be used.



IT IS BETTER TO MAKE WATER COOL BY PACKING ICE AROUND THE VESSEL CONTAINING IT THAN BY PUTTING ICE INTO THE WATER.

The danger from the use of impure water is sometimes made an excuse for using wine, beer, and similar drinks. While these are mainly water, they cannot take the place of pure water in supplying the needs of the body. These drinks all contain *alcohol*, a substance which robs the body of water. Their use does not really quench the thirst of the body. Instead, they are likely to create thirst. For this reason beer and whisky consumers usually drink great quantities of water after they have indulged heavily in alcoholic drinks. Sometimes they try to quench their thirst by drinking more beer or whisky, and so they go from bad to worse.

Wine is made from the juice of grapes. When the juices of fruits are fresh, they make good drinks. While ~~Fermented~~ the juice remains in the fruit, it keeps fresh for ~~drinks~~ a long time, because the skin protects it. When the skin is broken and the juice is pressed out and left open to the air, it soon begins to change. This is caused by tiny plants, called *yeast* plants. These drop into the juice from the air, in which they are always floating. There is fruit sugar in the juice, and these tiny plants are fond of sugar. It makes them grow very fast.

Wherever the yeast plants are feeding and growing, two kinds of wastes are thrown off. One is a gas, the same gas we ourselves breathe out, *carbon dioxide*. This forms in froth or bubbles on the top of the fruit juice and finally passes off into the air. The other waste is alcohol. This remains in the liquid, giving it a peculiar taste. We may rid the juice of the alcohol by boiling it,

but its first sweet flavor and freshness will have been lost through the activity of the yeast plants. This change which the yeast plants bring about is called *fermentation*. If you should pour alcohol ^{Alcohol} upon a plant, it would soon die. Put any living creature in alcohol, ^{a poison} and it will die almost instantly.

Any drink which contains alcohol is hurtful to the body, and we should avoid its use. People seldom take enough alcohol to kill them outright; but, however small the amount they take, it is likely to injure them little by little. Hard cider, beer, ale, porter, wine, whisky, brandy, and rum are all alcoholic drinks. Many patent medicines and so-called *bitters* contain alcohol and ought to be avoided.

Sometimes people steep herbs, barks, roots, raisins, and so on in water, add sugar and yeast, and brew a homemade liquor. This too, when it is fermented, contains alcohol. Some alcoholic drinks contain much more alcohol than do others. Whisky, brandy, and rum are *stronger* drinks than beer, wine, and hard cider.

The appetite for alcohol grows when indulged, calling always for more, so that one may become the victim of alcohol. Then he cannot control his desire for it, and he will drink it even when he knows it is injuring him and even when he loses his money and his friends by so doing. An habitual drunkard is really a diseased person who has lost his power of controlling himself.

Persons who use alcoholic drinks are more liable to suffer from diseases than are those who do not use them, and as a rule they do not live so long. It has been noticed by physicians that when such a person meets with an accident or becomes sick he does not get well so fast as does one who drinks only pure water.

The records of the New England Mutual Life Insurance Company show the death rate of moderate users of alcohol to be more than double that of total abstainers; that is, for every hundred deaths of total abstainers, two hundred twelve users of alcohol living under like conditions would die. Users of alcohol were found to suffer from hardening of the liver, five or six times as frequently as abstainers.

Those who use alcohol are twice as likely to die of Bright's disease as are abstainers.

Most boys and girls like to visit a soda fountain for a cooling drink on a hot day. A glass of pure water Soda foun- charged with gas and flavored with pure tain drinks sirups or fruit juices is most pleasant. But there are many soda fountain drinks which are highly injurious, especially those which contain caffeine, as some of them do. Then, too, many of the drinks at soda fountains are made harmful by the use of artificial sweets and poisonous coloring substances and flavors. Often the water used in making these drinks comes from an impure source. Frequently the dishes used are not kept perfectly clean. So you see that it is best for a person to keep away from soda fountains, unless he

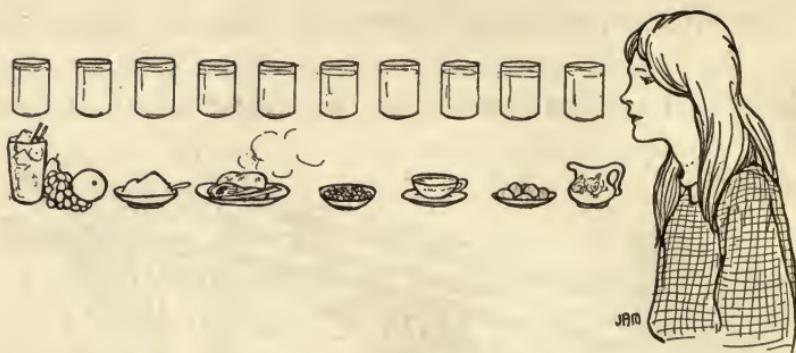
is sure that everything served to him is clean and pure.

REMEMBER: Pure water is the safest of all drinks.



"MANY SODA FOUNTAIN DRINKS ARE INJURIOUS, ESPECIALLY THOSE WHICH CONTAIN CAFFEINE."

We may add to it various fruit juices if we choose, making many healthful beverages with which to quench our thirst. We shall enjoy life most if we early form the habit of:—



WE NEED ABOUT TEN GLASSFULS OF WATER EVERY DAY, BUT WE GET MUCH OF THIS IN OUR FOOD.

- (1) never drinking for the purpose of washing down food;
- (2) avoiding tea, coffee, and all fermented drinks;
- (3) eating an abundance of ripe fruits.

HEALTH PROBLEMS AND PROJECTS

1. Some persons think they cannot swallow any food without taking water or milk or some other drink with it. Could you tell such a person what to do in order to be able to eat his food without washing it down with drink?
2. Show by an experiment of some sort that the following articles contain water: apples, peaches, cherries, bananas, cabbages, lettuce, potatoes.
3. How do you cool the water you drink in summer?
4. When typhoid fever breaks out in a city or town, the officials at once have the drinking water examined. Why?
5. Examine a can of fruit which has been fermented, and describe what you find. Take a little fresh fruit juice of any kind, and let it stand in the room uncovered for a few days. Describe the change which takes place in it.

REVIEW QUESTIONS

1. What proportion of the body is water?
2. Why does the body need water?
3. How does the body show that it needs water?
4. How much water does one need during a day?
5. How should one drink very cold water? Why?
6. From what sources is one likely to get the purest water?
7. What can we do with impure water to make it pure?
8. When is ice likely to be impure?
9. What is the best way to cool water?
10. What are some common *fermented* drinks?
11. Does the use of alcoholic drinks promote good health? Why?
12. Do the drinks found at soda fountains promote good health as a rule? Why?
13. Does the habitual use of tea and coffee promote good health?

CHAPTER XIV

THE CHOICE AND PREPARATION OF FOOD

"PAPA," exclaimed Mary and Henry in concert as their father was going with a basket toward the garden, *The food plants in the garden* "may we go with you?" "Yes, indeed," said their father; "come right along, and I will tell you about the things that grow in the garden, while you help me to gather some lettuce. And since it is a holiday, you may help me to plant some of the new seeds I brought home with me last night." As they went to the garden together, their father said: "You know that all food really grows out of the earth. The sunshine makes it grow. There are many kinds of foods to supply our various tastes and our many needs.

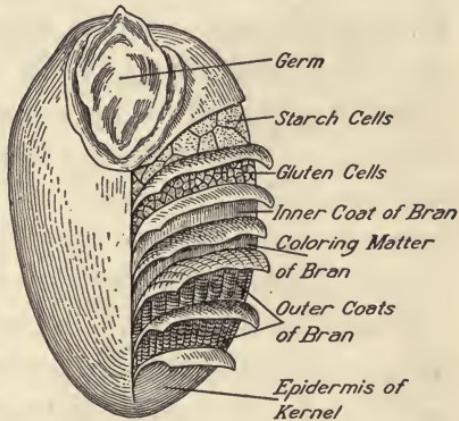
"All fresh garden things are excellent for health. The peas are rich in building material for muscles and bones. They are especially good for growing boys and girls. The lettuce is rich in iron, which makes the blood red. A cow can live on green leaves alone; but we need other foods, although it is important that we should eat some fresh uncooked food, such as lettuce, celery, or fresh fruit, at least once a day and at every meal if possible."

The asparagus, beets, greens, and other vegetables

which grow in the garden are useful both as body-building and heat-making foods. Also they give a certain bulk to the food, which is necessary in order that the colon may get rid of waste matter. When the colon is inactive, as we have seen, the food remnants ferment and decay, and the poisons thus produced, when absorbed, cause headache, a coated tongue, a bad breath, a muddy complexion, colds, catarrh, and many other common troubles. All fresh garden vegetables are good to keep digestion active and the movement of the colon regular. The potato is one of the best of foods. Its frequent use helps to keep the body free from poisons.

The father told also of grain foods, such as wheat, of which bread is made, oats, corn, and rice. One thing about wheat is important to remember: The millers, in making fine white flour, take out so much of the best part of the wheat that graham bread, which is made of the whole wheat flour, contains four times as much *bone-building* material as does fine white flour bread. Boys and girls who want to grow up sturdy and strong should eat more graham than

The grains



NOTE THE VARIOUS PARTS OF A KERNEL OF WHEAT. THE MILLER WHO MAKES FINE WHITE FLOUR REMOVES SOME PARTS OF THE KERNEL THAT ARE USEFUL AS FOOD.

fine flour bread. Graham bread also helps the colon to get rid of waste matter.

The father explained that garden soil is the home of a vast multitude of small forms of life. For the most part, these are harmless. But sometimes there are among them certain kinds of germs, or bacteria, that cause disease. Sometimes too the top dressing used to enrich the soil contains eggs of minute creatures which, if swallowed with one's food, hatch out in the body and become parasitic worms; these live and multiply in the intestines and do great injury. Such eggs get on leaves and fruit which grow near the ground. So it is wise always to give such foods as lettuce, celery, cress, and strawberries a thorough washing before using them. This is just as necessary if such foods are brought from the market. Cases of typhoid fever have been traced to lettuce eaten without cleansing. It is believed that other grave diseases come from the same lack of care.

Even those fruits that grow on bushes and trees need washing, for they get covered with the dust that flies about in the air, and dust generally carries germs along with it. If we gather cherries and such fruit when the sunshine has dried them just after a good shower, we shall find them clean. But fruit which comes from the market must always be well washed before it is eaten.

Dealers often keep stands of fruit for sale outside their doors. There the dust from the street gets on the fruit. A careful examination of small fruits purchased

Clean
fruit and
vegetables

in an open market showed in the water, after washing a small quantity of strawberries, 2,000,000 living germs; from the same amount of raspberries, 4,000,000; grapes, 8,000,000; currants, 11,000,-000; and cherries, 12,000,000. Some of these were disease-producing germs.

Ordinary washing of fruits and vegetables will not wholly prevent the danger from germs and parasites. Dipping such food in boiling water will destroy most of the animal parasites; but if fresh, uncooked foods have been handled by diseased persons, they should be placed for five minutes in a five per cent solution of peroxide of hydrogen. A solution can be prepared and kept for this purpose in the kitchen, especially in the summer time. A new solution should be prepared every week.

One day I saw a group of boys around a huckster's cart buying apples. As soon as each had made his purchase, he began to take large bites, eating both skin and pulp. I purchased some of the apples and brought them home, but found them so dirty that they had to



DEALERS OFTEN LEAVE THEIR FRUIT UNCOVERED ON A DUSTY STREET.

be covered with water and soaked for five minutes, then rinsed, and rubbed with a drying cloth before they were even decently clean.

The germs and dirt attached to fruit are sometimes the cause of intestinal troubles that are wrongly charged to the fruit itself, which would have been harmless if it had been clean.



ALL FRUITS AND VEGETABLES SHOULD BE THOROUGHLY WASHED BEFORE THEY ARE EATEN.

time so that they will not mash, and move the colander lightly down and up several times in a basin of clean water. A woman I know always washes strawberries with their hulls on; and when it is cherries or grapes she wants to wash or any firm fruit, she holds the colander under the faucet and lets the water run over the fruit for a minute or more. She washes lettuce in running water. Celery she cleans

Cleansing
berries,
etc.

The common practice of picking up fallen fruit from the ground and eating it out of the hand without cleaning it at all is also a dangerous habit. One can hardly be too careful always to eat clean food.

Here is a good way to wash berries and small fruits: Put them in a colander just a few at a

by scrubbing each stalk separately with a small vegetable brush. She says she always feels that she must wash huckleberries and cranberries especially clean, for one never knows whether the hands that picked them were clean or greasy and grimy with dirt.

But no matter how thoroughly the washing may be done, it is safer to dip the vegetables in the peroxide solution if there is doubt about their being free from disease germs. This is especially true of lettuce and celery, which are most likely to be dangerously soiled unless one is sure that they have been grown in clean places.

Late in the season when the corn is bearing ears, every one ought to gather some of the tender, juicy ears to eat fresh each day. May one eat corn raw? Yes, some varieties are very toothsome if gathered fresh from the stalk when each kernel is plump with the sweet juice. It is also very wholesome when cooked in any of various ways. One excellent way is to pick fresh ears of as nearly equal



THESE APPLES ARE BEING PICKED WITH DIRTY HANDS. SHALL YOU WANT TO EAT THEM WITHOUT WASHING THEM?

Preparing
foods for
the table

size as possible. Open the husks and remove all the silk, then replace the husks and tie them about the ears with a cord. Put the corn in a hot oven and bake for half an hour, or until it is tender. When boys go camping, they can cook corn in this way by burying it in hot ashes under live coals.

It is most important that foods should be *fresh*, whether milk, eggs, meat, vegetables, grains, or fruit. Any stale food is likely to be harmful. Nature has provided some foods, however, such as celery, cabbage, and apples, which may with care be kept fresh and good for use during the winter season. Many roots and tubers which ripen in the fall, such as potatoes, beets, and parsnips, provide us with variety during the winter and supply bulk for our food.

I saw Ann canning some strawberries yesterday, and this is the way she did it: First, she cleaned a quart jar; then, she filled it half full of water, fitted on the rubber and the top, and stood it bottom upwards on the table for a time to see whether the water would leak out, because if it did, she would know the jar was not air-tight.

Next, she made a sirup by heating together one cup of sugar and one and a half cups of water. Then she filled the jar with perfect strawberries that had been well washed and stemmed. Over these she poured enough hot sirup to fill the jar to the neck. She placed the lid, but not the rubber, on the jar without screwing it down. Then putting the filled jar in a shallow pan in

which was a little water, she set it in a cool oven. The heat was turned on very gradually so as not to crack the jar; at no time did she let it get so hot that the fruit juice boiled over the top of the jar. After the juice began to bubble well in the jar, the fruit was cooked for twenty minutes. The jar was then removed from the oven with care not to expose it to a draft, the lid was lifted quickly, and a clean rubber band which had been dipped in hot water was slipped over the jar. Ann filled it again to overflowing with boiling sirup and screwed the lid down (not quite tight), wiped it clean, and left it to cool for an hour. Then she screwed the lid as tight as she could.

One day Ann canned some string beans. After she had washed the beans and had taken off the strings, she cooked them until they were tender. Then she put



ANN KNOWS HOW TO CAN STRAWBERRIES SO AS TO PRESERVE ALL THEIR GOOD QUALITIES.

them in a jar, just as she did the berries, filled it with the boiling water in which they were cooked, and finished canning them in the same way as she had the strawberries. Beans and other vegetables require longer cooking than fruits to make them keep well. As an extra precaution against spoiling, the cooking of the canned vegetables may be repeated for one hour on two days in succession.

This is such an easy way to can foods that anyone should be able to do it successfully.

The value
of raw and
uncooked
food

Cabbages and other greens are of great value as sources of *vitamines*, which are most essential to growth and health. Some of these are destroyed by cooking. On this account it is desirable that we should eat some raw or uncooked food every day and preferably at every meal.

Cabbage, lettuce, celery, radishes, and tomatoes are among the best raw vegetables. Turnips, carrots, and a few other vegetables are also sometimes eaten raw. Drying has somewhat the same effect as cooking in destroying some of the valuable vitamines.

Animals as well as human beings require uncooked green food to keep them in health. This is the reason for the great value of the silo to dairy farmers. In the silo a sort of acid fermentation takes place which preserves the freshness of the food and does not injure the vitamines. Sauerkraut, a food prepared from cabbage and much used in central and eastern Europe, like the green fodder of the silo, is preserved by a process of

fermentation and is a most valuable source of green food for many millions of people. It might be more freely used in this country with advantage. After it is prepared, sauerkraut must be kept cold to prevent



GARDENING IS VERY FINE FOR HEALTH. BUT DO YOU THINK ALL THE BOYS AND GIRLS IN THIS PICTURE HAVE A GOOD WORKING POSTURE? WHICH ONES WILL TIRE QUICKLY BECAUSE OF THE POSITION THEY TAKE IN THEIR WORK?

further changes. When it acquires a bad odor, it is unfit for use.

Every home ought to have a garden. A garden not only gives an excellent chance for exercise of a most

healthful kind, but it provides many fresh foods which furnish to the body material that is not provided by other foods. They encourage appetite and aid digestion.

It is very necessary that food should be relished. When one has a keen appetite and a good relish for the food he eats, he is almost always able to digest it, and he is therefore benefited by it. But when one eats without an appetite, his food is not likely to be well digested, and it will not nourish him well.

Professor Pavlov, the great Russian scientist, has made a number of wonderful discoveries by means of

The "appetite juice" large and very intelligent dogs which he trained to assist him in the study of digestion. By experiments upon these dogs, Professor Pavlov learned, among other interesting things, that the stomach prepares a digestive juice to act upon the food while it is still in the mouth and before any portion of it has been swallowed. The simple taste of food causes an abundant outflow of this juice. The juice thus formed Pavlov calls *appetite juice*. In order that the proper amount of appetite juice may be produced, it is necessary that the food be thoroughly chewed. When food is swallowed hastily, it reaches the stomach before the latter is prepared to receive it, and it finds no juice ready to digest it.

REMEMBER: All fresh garden vegetables are excellent for health, furnishing body-building and heat-making foods and assisting the body to get rid of useless remnants of food. Fruits and grains also make excellent

foods. The fruits and vegetables should always be cleaned before eating; and the *whole* of the grains, except the hull, is better for food than the white part merely. A keen appetite and a good relish for food are always necessary.

HEALTH PROBLEMS AND PROJECTS

1. Many of the vegetables that grow in the garden may be eaten raw. Are they better when cooked? Why?
2. Some vegetables must always be cooked. Why?
3. Some fruits you like better cooked than uncooked. Why?
4. Are there any fruits that may be eaten when green? Why?
5. How may oats be used for food? Corn?
6. In canning fruit, why must one be so careful to boil the fruit and the sirup and seal the can air-tight while the contents are hot?
7. What is the best way to acquire a good appetite? Do you have a good appetite when you remain in the house all day? Why?
8. For what foods do you always have a keen relish? Would it be right for you to eat only those foods? Tell why.

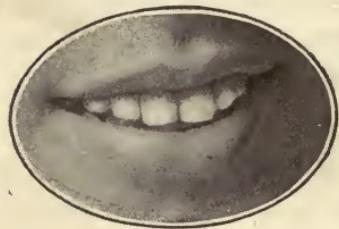
REVIEW QUESTIONS

1. What should be done to garden vegetables before they are eaten?
2. What grains are good for food?
3. Why is graham bread better for growing boys and girls than white bread?
4. Why should fruits always be washed before they are eaten?
5. What is a good way to wash berries? Celery?
6. Is corn on the cob good for food? How should it be cooked?
7. Are potatoes good for food? How should they be cooked?
8. Tell how fruits and vegetables may be kept in good condition for use during the winter.
9. Why is a keen appetite necessary for good digestion?

CHAPTER XV

THE CARE OF THE MOUTH

THE teeth have a most important share in keeping the body in health. It is only through their aid that we can bite and crush all the solid foods that we take into our mouths. In fact their chief business is crushing and grinding food. If this is not done well, then the very first work in digesting food is left unfinished, and through all the rest of the process there will be trouble, because the food was not started off right.



CLEAN, SOUND TEETH, STANDING LIKE SOLDIERS ALL IN A ROW.

To do the work in the best manner requires a full set of healthy teeth.

Nature provides a young child with a set of twenty teeth, all that his little jaws are able to hold. These are for use only during the early years and are called *temporary* teeth. As growth proceeds

Starting
the food
right

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Of course one cannot chew his food properly unless he has good teeth with which to do it. Even if there be but one bad tooth or a single one missing, the chewing of food is likely to be imperfect.

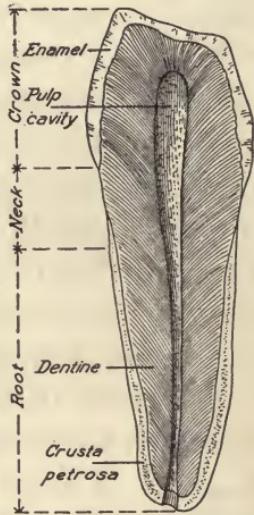
The teeth

Nature provides a young child with a set of twenty teeth, all that his little jaws are able to hold. These are for use only during the early years and are called *temporary* teeth. As growth proceeds

and the size of the jaws increases, these first teeth drop out from time to time, and a larger set of thirty-two teeth finally takes their place. These last are called the *permanent* teeth. They are longer and stronger than the first set and are intended for use during the remainder of one's life. If any of these are lost, others will not come to replace them.

When the teeth first appear in the mouth, they are sound, white, and beautiful, and with good care from the beginning they may be kept so till old age. Clean, sound teeth, standing like soldiers all in a row, add much to a person's appearance. This is another reason why the teeth should receive the best care. When we see a person in whose mouth is a set of dirty, ill-kept teeth, we get much the same impression of him that we do of a person whose hands and face are dirty or whose clothing is torn and soiled; or of a farmer whose fences are tumbling down and whose garden is full of weeds.

The chewing surface of a tooth is called its *crown*. This part of the tooth is protected all over with *enamel*, the very hardest material in the body. The portion of the tooth within the *gums* is called its *neck*. To hold it in position, it is firmly fastened by a *fang*,



WHEN YOU STUDY THE WAY IN WHICH THE TEETH ARE MADE, YOU CAN SEE WHY THEY MUST BE KEPT CLEAN, AND WHY THEY MUST NOT BE USED TO CRACK NUTS OR ANYTHING HARD.

or *root*, to the jawbone. There are differently shaped teeth for different uses — some sharp for cutting food, while others have broader surfaces for crushing and grinding. We have no teeth for tearing food, such as are found in the mouth of the dog, for we have no use for such teeth. See whether you can locate these differently shaped teeth in the mouth.

All are made good and strong on purpose so that they can readily crush such foods as crackers, toast, and zwieback. One's teeth need exercise to keep them strong just as much as do other parts of the body; so at every meal we should eat some hard foods which need much chewing. But the teeth are not so strong that they can be used safely to crack such things as hickory nuts. The enamel which covers the teeth is brittle, like china; and if the teeth are used to bite hard objects, such as steel or stone, it may be very easily cracked or chipped off. So long as the enamel remains sound, the tooth is well protected.

You have already been told of the tiny colorless plants so small that six hundred millions (600,000,000) bacteria in of them could be packed in the space occupied the mouth by a grain of sugar. They abound in the air. They get into the water we drink and the food we eat. Some of them are harmless, but others do us much damage. They multiply very fast if they have a warm place and moist food. They cannot live in strong light. When they get into our mouths, as they are always doing from the air or by means of our food and drink,

they find just what they like best — warmth, moisture, and darkness. And if there be ever so tiny a crack or break in the enamel of a tooth, they seek a lodging there and begin to grow and to make trouble for us. Anything likely to injure the enamel, like biting wire, pulling out nails, opening a knife blade with the teeth, or picking them with pins should be avoided. Why? Have you ever broken the enamel on one of your teeth? If so, how did you do it?

The teeth grow very close together, so that each one can help the others in chewing. Still there is a space between them large enough so that particles of the food we eat can collect in them. If the teeth are not well cleaned after meals, these particles of food make a tempting banquet for germs. The germs are not slow in taking advantage of their chance; and if there be some food left there every day on which they can feed, they may in time make holes for themselves in the enamel of the teeth. When once they get inside, the work of decay will go on rapidly. If we are careless and neglect to keep the mouth and teeth clean, we need not be surprised to find some day that these little bacteria have begun to spoil some or all of our teeth. It has been found that a very large proportion of all the school children in the United States and England have bad teeth. What a loss this is!

If the teeth are not cleaned and polished every day, a film forms upon them. Hidden under this film, the germs which cause decay grow and multiply and bore

HEALTH HABITS

their way into the teeth. Under the same conditions germs attack the gums and produce ugly sores in the soft parts and loosening of the teeth. In time the teeth may even fall out.

Many times the germs work their way down to the roots of the teeth and produce sores from which the



germs and the poisons which they produce are carried by the blood to all parts of the body. This may give rise to rheumatism and other painful diseases. So it is very important to take good care of the teeth. You know that to be sound a horse must have good teeth. This is just as true of a man as of a horse. A man who does not have good teeth is not a sound man.

Some people think it is not necessary to care for the first set of teeth, since they will be shed after a time.

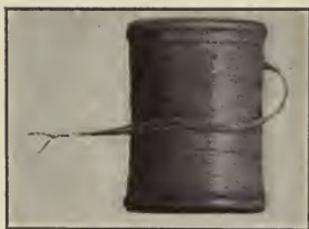
But this is a mistake. A "baby" tooth that decays is very apt to injure the new tooth that comes in its place. One that is not pulled in time causes the second to be crowded and irregular.

Even the baby's teeth need to be kept clean. A swab of cotton on a toothpick is best for this, because the baby's gums are too tender to bear the use of a toothbrush. Older boys and girls should use a small, stiff brush — one that will reach into every crevice. It should be used on every part of every tooth, outside, behind, on top, and between, brushing *up* on the lower teeth and *down* on the upper ones. A soft silk thread or *dental floss* should be drawn around and between the teeth to clean out small bits of food.

All persons, young and old, should make it a regular practice to finish every meal with a thorough cleaning of the mouth and teeth. When the school bell rings before luncheon is over and one's toothbrush is in the bathroom upstairs, one should at least rinse his mouth well with a glassful of water and not forget to clean his teeth at night thoroughly.

One should be careful to clean his toothbrush thoroughly each time after he has used it and then keep it in a clean place so that it will not become soiled. Care should be taken also not to hurt the gums while brush-

Keeping
the mouth
clean and
the teeth
sound



DENTAL FLOSS, TO BE USED
IN CLEANING THE TEETH.

ing the teeth. The brush should not be so stiff that it will make the gums bleed.

A fine way to polish the teeth is to rub them with soft porous paper, such as is used for paper toweling. A piece of such paper rolled around a lead pencil makes a very good tooth polisher. A still better way is to use

a little pad of paper held in a proper holder. A polishing stick should also be used. It should be made of orange or other hard wood with one end sharpened like a lead pencil. With this the surfaces between the teeth may be polished.



THE TEETH MAY BE POLISHED WITH PAPER SUCH AS IS USED FOR PAPER TOWELS.

prevent any further damage and make the tooth still of service in chewing. One should not delay in attending to this, or the tooth may be wholly destroyed. And it is a serious thing to lose even one tooth.

We cannot always ourselves see where the germs have started their work. The teeth by aching most

painfully often make known to us that the bacteria are at work. But by this time much harm has already been done. It is wiser to make regular visits to some good dentist, at least twice a year, and have him examine the teeth and clean them. The high polish which he will give them makes it harder for the food and germs to cling to them; and if there are any places where the enamel is broken or decay has begun, he can repair the tooth before great harm has been done.

By polishing the teeth with paper and the polishing stick, the teeth may be kept as smooth

and white as the dentist leaves them. When cared for in this way, the teeth do not decay, and disease of the gums (*pyorrhœa*) will usually disappear.



"EVERY ONE OF MY TEETH IS SOUND."

Dead teeth, or those in which the nerves have been killed, together with teeth with artificial crowns are likely to cause trouble. Such teeth should be examined by means of the X-ray to see whether there is any disease of the roots. When serious disease is found in any tooth, it should be drawn at once, not only to prevent spread of the disease to other teeth, but also to prevent the injury to nerves, joints, and other parts likely to result if the tooth is not drawn.

There are various routes, beside those already mentioned, by which harmful bacteria reach the mouth.

Habits that cause mouth diseases One route lies through the habit, so common among children, of holding in the mouth pins, pennies, pencils, marbles, and other articles liable to carry bacteria. The practice of exchanging bits of candy, chewing gum, whistles, or anything that has been put in the mouth, wetting a lead pencil with the lips, tasting with another child's spoon, and drinking from a common cup are other ways of getting these dangerous germs into one's mouth.

Another very common harmful habit is that of putting the fingers into the mouth. The fingers more than any other part of the body come in contact with things that are more or less unclean. Things handled by many people, as books, doorknobs, the stair railing, the baseball, or bat, may each or all have on them harmful bacteria which have come from some one's hands. These may get on your own hands. If you should then

put your fingers in your mouth, what would probably happen?

About two things we cannot be too careful:

1. To wash the hands very often.
2. To keep the fingers out of the mouth and also out of the nose and eyes.

By experiments made with a drinking cup in a city school, it was found that

in a space no
larger than the
head of a pin
on the brim of
Avoid the
public
drinking
cup!

a cup which had been in use for nine days, there were over one thousand bacteria. It was estimated that the edge of the cup likely to be touched by the lips in drinking bore not less than five million germs. In one school twenty-four persons who drank from a cup that had been used by a pupil having diphtheria all took the disease. In another school the teacher and every pupil who used a cup from



WHEN ONE DRINKS FROM A BUBBLE FOUNTAIN, ONE AVOIDS THE DANGER OF SWALLOWING GERMS THAT ARE OFTEN LEFT ON PUBLIC DRINKING CUPS BY PERSONS WHOSE HANDS AND LIPS ARE NOT CLEAN.

which a child with the measles had drunk became ill with measles. It will do us little good to drink pure water, if in doing so we offer to injurious germs a lodg-ing place in the mouth.

The public drinking cup is a deadly thing, and no one should use it. Every person should carry a pocket cup of his own. If one needs a drink when no cup is at hand, he may make a cup by folding a piece of paper, or he may use an envelope. A bubble fountain is a simple and safe device for providing the public with drinking water.

REMEMBER: Sound teeth are necessary for good health. The teeth should be cleansed thoroughly after each meal; and they should be examined regularly by a good dentist. The mouth is a door to the body. Keep it closed against germs.

HEALTH PROBLEMS AND PROJECTS

1. If you can do so, look at the teeth of a three-year-old child and describe their appearance and their condition.
2. Where in the mouth are the teeth used for cutting food? Where are those used for crushing food?
3. What may happen to one's teeth if he uses them for biting wire or nails?
4. Suppose one should always gulp down his food without grinding it or should eat only mushes, what would happen to his teeth? Why?
5. Figure out which will take more time, to rinse or brush one's teeth after each meal, or to have one or two or more decaying teeth filled by a dentist each year. Which will cause more trouble and expense?

REVIEW QUESTIONS

1. What part do the teeth play in keeping the body in health?
2. What are the "baby," or temporary, teeth? The permanent teeth?
3. What may cause teeth to decay?
4. What is the *crown* of a tooth?
5. What is the *enamel*? What is its use?
6. What will happen to the teeth if the enamel is broken?
7. What exercise strengthens the teeth?
8. What is meant by *bacteria*, or *germs*, in the mouth?
9. What will help the growth of germs in the mouth?
10. How often should one clean the teeth?
11. How should the cleaning be done?
12. How often should one visit the dentist? Why?



PERHAPS YOU HAVE CLEANED YOUR TEETH EVERY MORNING AND EVENING SINCE YOU WERE A BABY. IF YOU HAVE, YOU DO NOT NEED TOOTH BRUSH DRILLS LIKE THIS.

CHAPTER XVI

THE CARE OF THE SKIN

ANYONE who has ever had the misfortune to tear a piece of skin from a finger, toe, or other part of the body knows how the tender flesh underneath smarts and stings. One who has had the bad luck to get dust or dirt on such a raw place has probably had to endure a painful sore.

The skin, which clothes the whole body, protects the sensitive flesh. The skin is soft and smooth. It stretches enough for us to bend an arm or leg easily, and it is never too small, no matter how much we grow. It is so strong that it does not break easily when we come in contact with rough objects. It fits so perfectly that it has the exact shape of the body. At the lips and nose it becomes finer and softer and is called the *mucous membrane*, "a lining skin." This membrane lines the nose, mouth, throat and all the inner parts of the body.

Some persons like to strip the spicy bark from a birch tree and chew it. If you have ever done this or have peeled the bark from some other young tree, you have doubtless observed that on the outside there was first a very thin layer resembling paper, and under this a

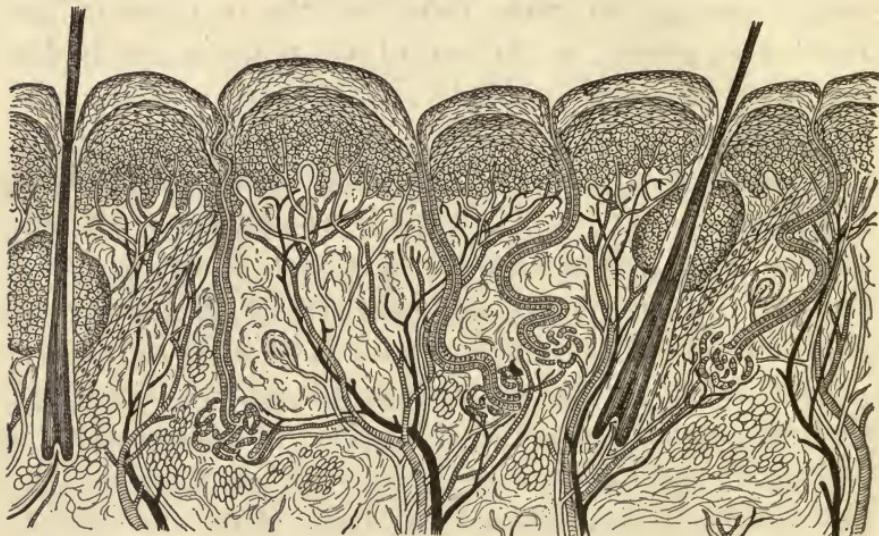
much thicker bark next to the wood. It would not do the tree much harm if you should remove this outer bark. Indeed the bark of white birch trees peels off itself little by little. The bark of the tree does not stretch enough to make room for the increase in size as the tree grows; so the outer layer tears and is shed as the wood beneath it needs more room, and the new bark grows to take its place.

If you tear off the inner bark, it will injure the tree. It will make it "bleed"; that is, it will cause the sap to flow freely. The sap, we may say, is the blood of the tree. If the torn place is not too large, it may heal over, but an ugly scar will remain in its place.

The skin covering our bodies, like the bark covering the tree, is made up of two layers. The outer layer is called the *scarfskin*, or *epidermis*. It is thin, ^{The} like the skin that lines an eggshell. There is *scarfskin* no blood in this outer skin; neither is it very sensitive. Using a very fine needle and thread, you can take a stitch in it without making it bleed or without causing pain. The *scarfskin* has several thin layers of small scales joined at their edges. Those in the outside layer are no longer of use and are all the time being shed or rubbed off. Every time the hands are washed with soap and water or rubbed with a towel some of these scales are rubbed off. It is a curious fact that new ones are all the time crowding the old scales upward to the top.

On most of the body the outer skin is very thin. It

is thickest usually on the palms of the hand and the soles of the feet because these parts more often come in contact with hard objects and hence need better protection. Can you locate the tough parts on your hands



YOU COULD TAKE A STITCH IN THIS SCARFSKIN WITH A VERY FINE NEEDLE AND THREAD WITHOUT MAKING IT BLEED OR CAUSING PAIN. IS THIS A WISE PROVISION?

and feet? Is there some such thick skin on any other part of the body?

The underside of the first skin is colored, being spread over with tiny grains of coloring matter, called *pigment*. In negroes this pigment is sometimes brown and sometimes nearly black. White persons have very little of it. The heat of the sun increases the *pigmentation*, and this is why the skin tans when much

exposed to the sunshine. If the coloring increases in spots, the skin appears *freckled*.

The inner, or second, layer of skin on the body, like the inner bark of the tree, is much thicker than the outer layer; it is also more important and so ^{The} *true skin* is called the *true skin*, or *dermis*.

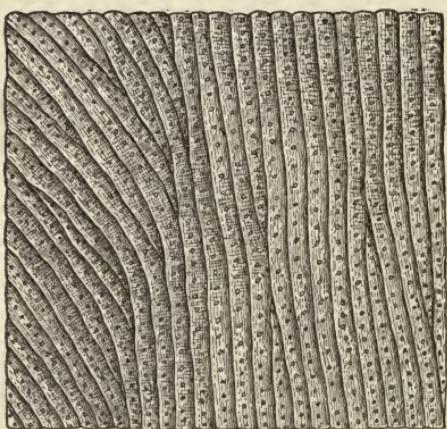
If we scratch or cut this skin, it bleeds and smarts. If we meet with a mishap which destroys a portion of it, there will be a scar when it heals — a sort of patch by which nature tries to remedy the defect. Have you a scar of this sort?

Besides protecting the body from injury, the skin serves the body in several other ways. We can tell by means of the nerves it contains whether objects are rough or smooth, whether hard or soft, and whether cold or hot.

If we look through a magnifying glass at the palm of the hand, we find it covered with very fine ridges and furrows. Along the top of the ridges appear many little dark spots. These are very tiny holes, ^{Our} called *pores*. Each pore is the opening for a ^{pores} very small tube which runs down through both layers of the skin. At the lower end it is rolled up in a coil, as you see in the picture. These coils are *perspiratory glands*, so called because they separate from the blood the fluid we call *sweat*, or *perspiration*. There are more than three millions of them in the skin, but they are most numerous on the palms of the hands and the soles of the feet. These glands are always busy at work

sending out perspiration through the pores, although we usually do not notice it except when it flows so fast that it forms in drops.

We can make sure that the skin secretes moisture by trying a simple experiment: Press the finger tips or the whole hand for a moment on the dry surface of a



WHEN YOU LOOK AT THE PORES OF THE SKIN, YOU CAN SEE HOW IT IS THAT SWEAT, OR PERSPIRATION, CAN COLLECT ON THE SURFACE OF THE SKIN WHEN WE HAVE BECOME VERY WARM.

freely that it collects on the surface of the skin in big drops. But at other times it flows slowly, and we do not see it. Yet during each twenty-four hours almost enough to fill a quart measure passes from the body of an adult. If one is working hard, the amount given out may be very much greater than this.

As soon as the perspiration reaches the surface, it evaporates and in so doing makes the body cool. This

mirror or some brightly polished metal. The place which the hand covers will look moist and dim. This is because perspiration oozed out of the pores of the hand while it was on the glass, though we could not see it by merely looking at the hand.

When one is working or playing hard or when he gets very warm, the perspiration flows so

is another useful thing the skin does for us. It helps to keep us cool in hot weather, or in other words it regulates the heat of the body. When the skin is moist with perspiration, we should take care not to sit in a wind or a draft, for we may be chilled by the rapid evaporation of the moisture.

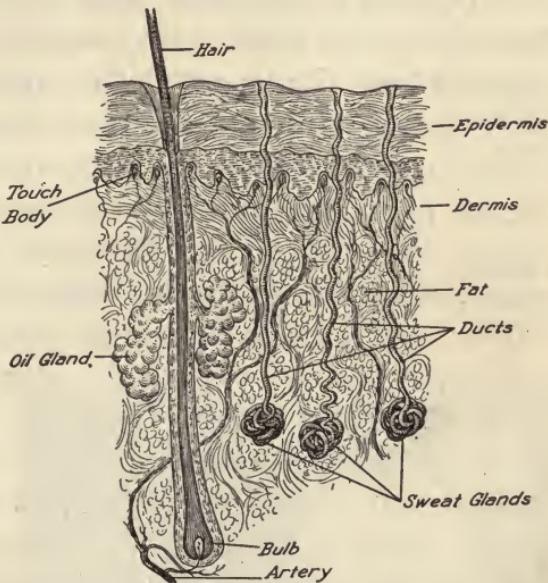
How the
skin regu-
lates the
body heat

You can see how this happens by moistening the finger nail and blowing upon it. Although the breath is warm, the nail will feel cool because of the rapid evaporation of the moisture.

The perspiration is mostly water; so the more we perspire, the more water we need to drink in order to keep the proper supply of moisture in the body. Per-

spiration also contains a considerable amount of waste matter formed in the body. Thus the skin serves another purpose — it rids the body of waste.

There are other glands in the skin besides the perspiratory glands. These make oil and pour it out upon



THE PERSPIRATION IS COLLECTED FROM THE BLOOD
BY THESE SWEAT GLANDS.

the surface to keep the skin soft and smooth. Show in some way that the surface of the skin is oily.

There are curious little pockets, too, from each of which grows a hair. Oil glands provide the hair with oil to keep it soft and glossy. Show in some manner that these oil glands supply oil for the hair.

The nails of the fingers and toes grow out of other little pockets in the skin. Both hair and nails are only portions of the outer skin, which has been curiously changed and hardened. The nails protect the ends of the fingers and toes and give them firmness.

The appearance of the skin more than any other feature makes the face ugly or beautiful. In order to

A healthy skin must be clean keep the skin in health, it must be kept clean. The waste matter which forms a part of the perspiration does not evaporate along with the water but dries upon the skin, making a sort of film all over the surface. If this is not removed, the film begins to decompose, giving rise to a very unpleasant odor. But the offensive smell is not the worst thing. The poisons formed are absorbed into the body and produce various painful and disgusting diseases of the skin.

Sometimes people try to hide a dingy skin on the face by covering it with paint or powder. This is a sham. It does not help the real trouble at all. The skin cannot be made soft and white by such means. Besides, these paints and powders sometimes contain poison.

The really beautiful skin is the healthy skin. To keep the skin healthy, one must always keep it clean so that its perspiratory glands will be active and its pores will be open. Indeed the whole body must be kept clean — clean on the outside and clean on the inside — that the skin may be kept in health. A clean, moist, healthy skin is the sign nature hangs on the outside to indicate that the whole body is in good health.

The appearance of the skin is a sign of the condition of the health. A dingy, clammy, or dry and wrinkled skin is an indication of disease and feebleness. It may truly be said that a person is as old as his skin. The glands of the skin and its other parts shrivel and waste away in old age. Brown spots appear upon the skin that are due to the deposit of poisonous coloring matters.

The appearance
of the
skin shows
health or
disease

The skin in old age loses its elasticity. Instead of being elastic like rubber, the skin over the back of the hands may be made to stay in folds by pinching with the thumb and finger, as shown in the accompanying pic-



THE WRINKLED SKIN OF OLD AGE CONTRASTED WITH THE SMOOTH, ELASTIC SKIN OF YOUTH.

ture. This cannot be done in a person whose skin still retains its youthful elasticity, and it is a sure sign of old age, as is also the thinning of the skin, which sometimes becomes so thin that the blood vessels and other parts can be seen through it. This condition of the skin is an indication of the general state of one's health, for, while the wasting process is going on in the skin, the same thing is taking place in the liver and kidneys and in other important organs in the interior of the body.

Daily cold bathing, sun bathing, and exercise in the open air are highly important means of keeping the skin healthy. When the skin is kept healthy, the rest of the body is also likely to be in health.

Most children wash their faces and hands every morning upon rising. The rest of the body needs care

Bathing as well as the hands and face. The air and sunshine bathe the face, and its skin is kept much freer by their action from the waste of the body than are the parts which are covered with clothing. Why? The entire skin should have a daily cleansing. A morning bath is an important health habit. For a person in health, a cool or cold bath is better than a warm one, because it not only serves to cleanse the skin but it makes one feel fresh and full of energy. Also, cold water hardens and trains the skin and makes one less liable to colds. The person who forms the habit of taking a cool or cold rub or shower regularly every morning will soon have his skin so trained that he will be protected against colds.

The temperature for what is called a *cool* bath ranges from 70° to 80° , a *cold* bath from 60° to 70° . Delicate persons should test the water with a bath thermometer.

If one is not used to cold-water bathing, he should always begin with moderately cool water and gradually make it colder. In this way one can, after a time, take a cold bath with no harm to himself. There are some points, though, which one should always bear in mind when taking a cold morning bath:

1. The room in which the bath is to be taken must be warm (70° to 80°).
2. Whenever possible, a short hot bath should precede the cold bath. The best way is to take a hot shower for half a minute and follow immediately with a cold shower.
3. Always bathe the face and neck first with cold water before bathing the rest of the body.
4. The cold bath should be taken at once upon rising, while the whole body is still warm. It is not safe to run about barefooted and in night garments after getting out of bed before taking a cold bath. *A cold bath to a cold body is dangerous.*
5. If on getting up in the morning the hands or feet are cold or if one feels at all shivery, a short (2 to 4 minutes) hot bath should first be taken to warm the body, and after that the cold bath may be taken. If there is no hot water, warm the body first by rubbing it with a towel or by some brisk exercise, such as jumping up and down for a few minutes.



A BATH THERMOMETER SHOULD BE FOUND IN EVERY BATHROOM AND SHOULD BE USED TO REGULATE THE TEMPERATURE OF THE BATH.

6. Cool or cold baths should be of *short duration*. Half a minute is long enough. The colder the water, the shorter the bath should be.

7. After a cool or cold bath, every part of the body should be rubbed briskly with a towel until it *looks red* and feels warm.

8. The drying should always be quickly and thoroughly done.

Cool and cold baths may be taken by a plunge in a tub of water of the proper temperature or by a shower or spray of water over the entire body while one is standing with the feet in warm water.

If one has no spray apparatus, a small tin watering can, such as the gardener uses to water flowers, filled with cool water, will serve as well.

A boy who wanted a shower bath each morning fixed one for himself by suspending from the ceiling just over a washtub a large tin pan, the bottom of which he had punched full of holes. Above this he hung a tin can for holding water. A hole in the bottom of the can was stoppered with a large cork. To this cork he tied a long string so that when he stepped into the tub he could pull the string, thus drawing out the cork and letting the water out into the pan to fall on him in a shower.

One can take a cold rub with just a washbowl full of water and two towels. Wet one of the towels and with it rub first the face and neck, then the arms and chest, abdomen, back, limbs, and feet in the order stated. Rub each part dry with the dry towel before wetting another part. For the back fold the wet towel

lengthwise, and wring nearly dry. Then with one end over the left shoulder and the other under the right arm rub crosswise. Then change to the other shoulder. Dry in the same manner.

When one has no conveniences for a cold-water bath, he may take a cold-air bath. A good way to do this is to sleep with one's windows open to the outer air. In the morning jump out of bed, disrobe quickly, and with a coarse towel rub every part of the body hard and fast while exposed to the air for half a minute in winter-time and for three or four minutes or longer in warmer weather.

One should always feel warm and in a glow at the end of a cold bath. If after any cold bath you feel shivery or cold when well dried, then something is wrong. Probably the bath was too long. In any case the proper thing to do is to exercise hard until



IF ONE CANNOT TAKE A COOL WATER BATH EACH MORNING, HE CAN AT LEAST TAKE A COLD-AIR BATH, AS THIS MAN IS DOING.

you are warm. Make the bath shorter the next time.

If you feel giddy or faint in a warm bath, leave it at once, dash cold water over the body, lie down, sip cold water, and put cold water on the face and head.

Rules for the warm bath Besides the daily morning bath to exercise the skin, one needs a warm soap-and-water bath for cleansing purposes at least twice a week. Baths for cleansing are needed more often in warm weather. Why?

The best time for a warm bath (95° to 98°) is at night just before going to bed. It should always be the rule to end the warm bath with an all-over dash of cooler water.

A hot bath, when one is in health, should be very brief; and always at its close the body should be cooled off in some quick or sudden manner, with a spray or shower or with dashes of cold water over the entire body.

One should not bathe just before or soon after eating. Why? One should exercise vigorously after a cold bath. Why? One should rest after a warm bath. One should never take a cold bath when very tired or when perspiring. Why?

The well-trained skin There are some races of people who, while living in a climate quite like ours, have such well-trained skins that they do not at all mind the cold although they wear very little clothing. A gentleman who was traveling in the West met an Ameri-

can Indian working without either shirt or coat. It was a cold, chilly day, and the gentleman in surprise asked the Indian, "Are you not cold?" The Indian replied by asking, "Is your face cold?" "Why, no," replied the man. "Well," said the red man, "the Indian all face." The skin of his body had become so used to the air that it did not feel the cold any more than his face did.

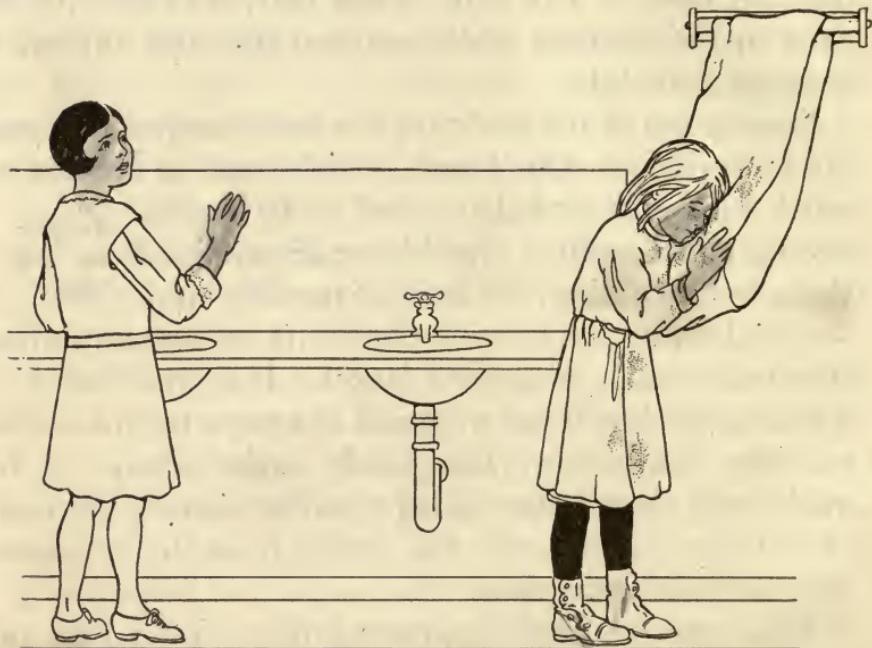
Some parts of the body require more frequent cleansing than others. Our hands, which come in contact so often with dust and dirt, need to be washed several times a day. Should one always wash them before eating? Why? If possible to do so, the best way is to wash them with soap in a running stream of water, as under a faucet. If we must wash in a basin, we should use a second or even a third basinful to rinse the hands. The hands ought always to be made very clean before using them in washing the face. In bathing the face, rub the eyelids from the far corner inward toward the nose.

Take care to avoid spattering dirty water into the eyes while washing the hands, as germs which may cause disease of the eyes may easily enter them in this way.

Wash cloths and nail brushes must be clean and must not be too coarse. A sour-smelling or musty wash cloth must be washed with soap and boiling water before it can be safely used.

Pure soap is also important. Most children prefer a

scented soap, but they should be sure that it is pure. Very poor soap sometimes has a pleasant smell. Mottled Castile soap is safe and pure. Soap should always be thoroughly rinsed off the skin with clean water, and then the skin should be well dried with a clean



VERY BAD DISEASES ARE SOMETIMES CAUGHT BY USING TOWELS WHICH HAVE BEEN USED BY OTHER PERSONS.

towel. Lack of care in this respect often causes the skin to chap.

Never dry hands or face on a public towel which some other person has used. If your school is not provided with individual towels, you should bring your

own towel from home just as you do your drinking cup. Even in one's home, each person should have a separate towel. Some most serious diseases may be passed from one person to another through the use of towels. The better way is for each person always to have his own toilet articles.

The hair and *scalp* (that portion of the head upon which the hair grows) need to be kept clean. A thorough brushing of the hair for five minutes every day aids in keeping it clean and makes it grow. Do you know why?

There are no set rules as to how often to wash the hair. It should be washed whenever it is soiled. When one lives much amid dust and dirt, the hair ^{Washing} _{the hair} as well as the body will need washing often.

As we have seen, nature provides the hair with oil from little glands in the skin. If the hair be kept clean and healthy, no other oil will be needed. Hair oils used on the scalp are likely to become rancid or foul in the hair, and they gather dust; they should therefore be avoided. Rubbing the scalp briskly for two or three minutes each day with the fingers moistened with cold water will help to keep the hair healthy.

Of course, hair-washing is more of a problem for most girls than for boys. It can be done easily and thoroughly, though, when one has running warm water, cold water, pure soap, and plenty of soft towels. Begin by brushing the hair upward toward the top of the head (it is easier to handle from the front) and make

sure that it is straight. If the hair is tangled when it goes into the water, it will come out tangled. With



long hair it is well to oil the free ends. Make a good lather with the soap. Moisten the hair and rub the lather well through the hair and over the scalp. Then the soap must be wholly rinsed off. A warm spray is best for this, but the hair may be dipped in and out of a bowl of water, if the water is changed two or three times. Repeat if necessary to make the hair and scalp clean and whole-

IT IS VERY IMPORTANT TO KEEP THE HAIR AND SCALP CLEAN AND HEALTHY. BEAUTIFUL HAIR ADDS MUCH TO ONE'S APPEARANCE.

some. Finish with a gentle dash of cold water to prevent taking cold. Dry by rubbing the hair between soft towels; and in warm weather gently shake it in the outdoor air and sunshine. In cold weather the heated air from the

furnace will help to dry the hair. Always brush out the tangles while damp, as the hair is easier to straighten then.

The hair needs sunshine and fresh air; so the less it is covered, the better. Hats and caps should be worn only out of doors. Combs and brushes for use on the hair should be kept clean. A woman I know cleans her brushes in this way: She puts a dessert-spoonful of ammonia with a quart of water into a shallow basin, then dips the brushes in it, taking care not to wet the backs. In two or three minutes the dirt comes out. Then in the same way she dips them in clean water to rinse them, shakes the water out, and puts them on a rack to dry.

Finger nails need special attention, not only because dirty nails appear untidy but because the dirt which collects underneath them often has *Caring for the nails* mixed with it some of the worst kinds of disease germs.



IT IS EASY ENOUGH FOR A BOY TO DRY HIS HAIR
AFTER HE HAS HIS WASHED IT, BUT IT IS
VERY DIFFERENT WITH A GIRL.

The nails can be kept clean very easily. When washing the hands, scrub the finger nails with a brush, and clean with an orange-wood stick.

While the nails are dry it is not wise to clean them with a knife or other sharp metal instrument which will scrape them. Such treatment will make the nails rough and harder to clean the next time. The nails

should never be bitten or torn off. They should be trimmed carefully and evenly with sharp nail scissors.

Especial care should always be taken to cleanse the hands thoroughly with soap and water after visiting the toilet. Neglect of this has many times



THIS IS THE WAY ONE'S HANDS SHOULD LOOK;
CLEAN, SMOOTH NAILS WELL-TRIMMED AND
NOT "IN MOURNING."

caused an outbreak of typhoid fever. Disease of the eyes may be due to the same cause.

When a person walks much in dust and dirt, his feet should have a daily bath at bedtime whether he takes a full bath or not. If one goes barefoot or if the feet perspire much, a tepid water-and-soap bath, with careful rinsing afterwards in cold water, should be taken every night. After the feet are thoroughly dried with

a soft towel, it is a good time to attend to the toenails, which like the finger nails should be kept clean and well trimmed.

REMEMBER: Every machine needs to be clean before it can do good work. The person who takes care to keep all parts of the body clean can work and play better and will feel better than one who is careless in this matter.

HEALTH PROBLEMS AND PROJECTS

1. Why should the *scarf skin*, or *epidermis*, not be very sensitive? What would happen to us if it were very sensitive?
2. Have you ever had callous places on your hands or feet? What are they? Do they hurt when you pinch them? Why?
3. Rub your hands or fingers over a piece of writing paper a number of times, and then see whether you can make a clear mark on it with pencil or pen. Explain.
4. What would happen to one if he should smear paint over all his skin so that it would stop every pore? Why?
5. Which would use up more time, do you think, to take a cold rub every morning or to be ill with a cold for two or three weeks every winter?
6. Should a person use on his hair a brush or comb which has been used by other persons? Why? Perhaps this picture tells you.



REVIEW QUESTIONS

1. What is *scarfskin*, or *epidermis*? What is its use?
2. What is the *true* skin, or *dermis*? What is its use?
3. What is the *pigment* and where is it located?
4. What is the meaning of "getting tanned"? What causes freckles?
5. Is perspiration good for the body? Why?
6. Why should one not sit in a cold draft just after perspiring freely?
7. How must the skin be cared for in order to keep it smooth and beautiful?
8. How does the skin secure the oil needed to keep it soft and elastic?
9. How often should one bathe the entire body? What is the best time for this bath?
10. What should be the temperature of the bath at night? In the morning?
11. How should one take his morning rub?
12. What dangers should be avoided in taking a cold or a warm bath?
13. How should one finish a hot bath?
14. How should one care for the hair? For the nails?

CHAPTER XVII

THE CARE OF THE EYES

A GREAT man of business who was losing his sight once said to his physician, "If you will restore my sight or direct me to anyone who can restore it, I will give you a million dollars." Great wealth without sight seemed to the rich man to be useless. If you had your choice, would you take a million dollars for your sight? I would not. Sight is worth more to any of us than money. Do you not think that when one has good sight he should take care of it so that if possible he may retain it as long as he lives?

Think how much we do that depends upon our sight. Every step we take is directed by it, although some persons when they have lost their sight can guide themselves to some extent by what is called the *muscular sense*, or the sense of touch. You have doubtless seen blind men on the street picking their way by means of a cane, but they can go only in very familiar places. I have asked many of these blind men whether they could find their way in any unfamiliar street or house alone, and they have said they could not.

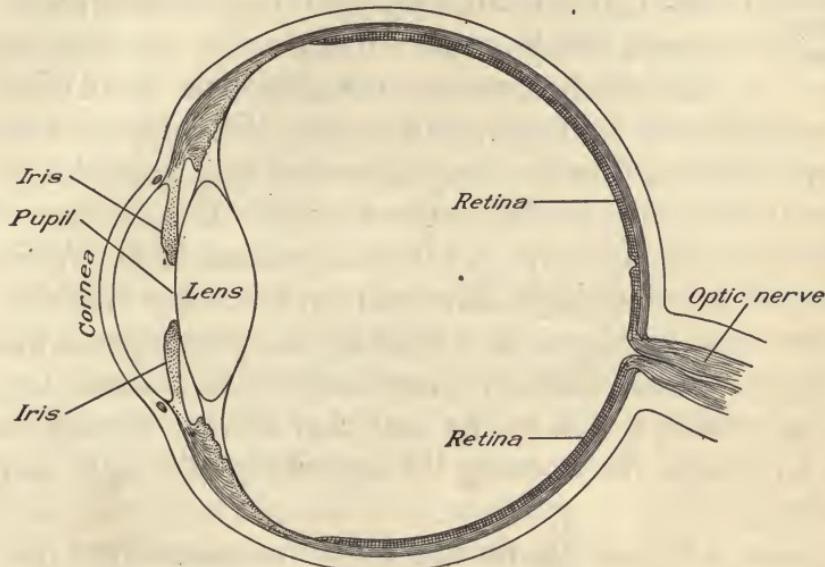
Think of all the pleasure which is gained from looking

at beautiful objects and colors and the faces of friends but which is lost when sight is lost. Think how great would be one's misfortune if he were deprived of the pleasure of reading. People who have become blind have told me that this is the greatest hardship of all — not to be able to gain pictures and thoughts from books. Surely you can appreciate how greatly our welfare depends upon our sight.

The eye is one of the most delicately constructed organs of the body. See whether you can think of any object that works so smoothly and marvelously as the eye does. It is constantly changing according to the amount of light that comes to it and also according to the nearness or remoteness of objects that are seen. It can turn about through all angles so as to view objects anywhere in front of us. Not only can one see the form of objects, but he can see a great variety of colors; and all this is possible because of the very remarkable construction of the *retina* at the back of the eyeball. The impressions that are made on the retina are carried to the brain and become pictures.

If you will look at another person's eye or at your own eye in a mirror, you will notice, first, that there is a clear, glass-like covering over the middle part of the eye; this is the *cornea*, and it protects the delicate structures underneath it. Then, you will notice a circular, black-appearing part right in the middle of the eye; this is the *pupil*, through which the light enters

the eye. Then there is a circular, colored part around the pupil, which is called the *iris*. Just behind the pupil, though you cannot see it because it is completely transparent, is the *lens*. In the back part of the eye are the *retina*, upon which the light falls, and the



THE HUMAN EYE.

optic nerve, which carries the impressions made upon the retina to the brain. These are the most important parts of the eye that we need to become familiar with at this time; there are other parts that are necessary for its proper working, but it is not needful for us to describe them here. As you go on in the study of the human body, you will learn more about the various parts of the eye.

If you will observe your own eye or the eye of another person, first in a room in which there is a good deal of

How the amount of light entering the eye is regulated

light and then in a room in which there is much less light, you will notice a change in the size of the pupil and also of the iris. In the light the iris will be a broad band while the pupil will be quite small, but in the dark the

iris will become a much narrower band while the pupil will become much larger. The iris and the pupil are constantly changing in this way according to the amount of light that enters the eye. It is the duty of the iris to protect the eye from too much light. When there is but little light it contracts, but when there is a great deal, as when one is looking at a page upon which bright sunlight falls, the pupil seems to become very small, which is due to the fact that the iris expands so as to reduce the opening through which the light may enter.

How is it possible for the iris to accommodate itself to the amount of light in order to protect the eye? It

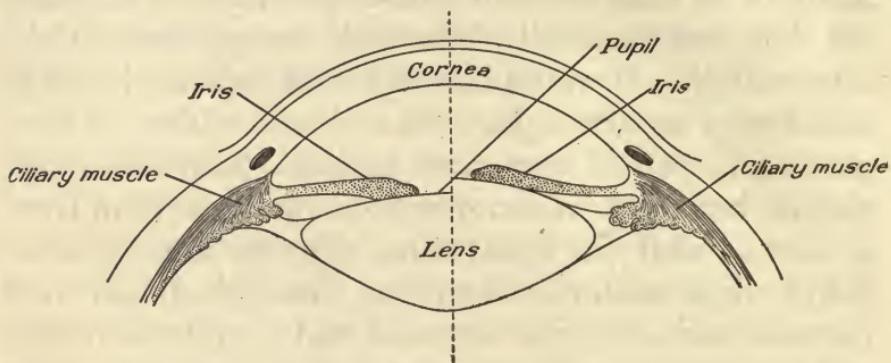
Protecting the eyes from over-strain is governed by very delicate muscles that are so sensitive that they respond to the intensity of the light. When there is but little light

they contract the iris; when there is a great deal they expand it. So long as these delicate muscles are not overworked, they will protect the eye perfectly; but if they become overstrained by too sudden changes from darkness into intense light, they may become unable to do their work properly. So one who wishes

to keep good sight throughout his life will not put too great a tax upon these delicate muscles of his eyes by reading in too intense or too dim a light. He will not change from a dark room to a very bright room suddenly or at least without shielding his eyes by closing the lids and gradually becoming accustomed to the intense light. It would be still better for one always to avoid very intense light. No one who wishes to keep good sight should ever read with an unshaded lamp, electric bulb, gas jet, or even a candle directly in front of him so that the light shines directly into his eyes. When one is reading and writing, the light should come from behind or above the head and from the left side, and it should be what is known as *dispersed light* — that is, it should never fall directly upon one's book or desk but should be reflected from the walls of the room or from near-by buildings. Of course one should never look directly at the sun or any strong artificial light.

A very important part of the eye, so far as taking good care of one's sight is concerned, is the lens. It is the work of the lens to bend the light as it enters the eye so that it will come to a focus exactly upon the retina. You will see from the drawing on page 188 how this is accomplished. The lens is so marvelously made and controlled by the delicate *ciliary* muscles that it can change its shape according as objects are close to the eye or far distant. If objects are very near, it must become more rounded than when they are far away, as you can see again from the drawing. So the

lens is constantly adapting itself to objects so as to have impressions from them strike upon the retina. When one's sight becomes poor it is often, though not always, because the lens cannot perform its work properly.



AN ENLARGED VIEW OF THE FRONT OF THE HUMAN EYE, ILLUSTRATING FOCUSING.

At the left:

The shape of the lens when one looks at
far objects.

At the right:

The shape of the lens when one looks at
near objects.

When boys and girls get into the habit of bending over their desks so that the eyes are not more than six inches away from their books or their writing, the lens after a time partially loses the power to adapt itself to objects at a distance. Such a person becomes *nearsighted*. One may be nearsighted also because the eyeball is so long that impressions from far-away objects cannot be made to fall exactly upon the retina. When objects are brought close to the eye of a nearsighted person, the lens can cause the impression to fall exactly upon the retina, and one can then see clearly. There are also persons who are *farsighted*

because the eyeball is too short and the lens cannot cause impressions from near objects to fall upon the retina though it may be able to do so with far-away objects.

There is another defect of sight from which some people suffer because the lens is not curved in the same degree in all its parts. In such a *Astigmatism* case the impression from one part of an object ^{tism} may fall upon the retina while the impression from another part of it may fall in front of or behind the retina. A person who has this defect is said to suffer from *astigmatism*.

From thirty-five to forty out of every hundred pupils in the primary grades suffer from either farsightedness, nearsightedness, astigmatism, or a combination of these defects, and about sixty out of every hundred pupils in the grammar grades and the high school have one or more such defects. A person who is afflicted with any of them cannot see so clearly, of course, as a person who has no defect; and he is likely also to suffer from headache and pains in other parts of the body if he uses his eyes very much. Physicians have shown that disturbance in the digestive system or in some other part of the body is often due to defective eyes. The strain on the delicate muscles is carried through the nerves to parts of the body far removed from the eye. Physicians all say that anyone who has a defect of the eyes must have it corrected if possible.

And how can a defect be corrected? Only by having

an examination made by a specialist who understands **Correction of defects** how to find out whether there is a defect; and if so, what kind of a defect it is. Sometimes children, as well as older people, have men examine their eyes who do not know much about the



IT IS ESPECIALLY IMPORTANT THAT EVERYONE SHOULD HAVE HIS EYES TESTED AT REGULAR INTERVALS, AND THAT IF ANY DEFECT IS FOUND HE SHOULD HAVE IT CORRECTED AT ONCE.

eyes. This is very dangerous, and it never ought to be done. You should appreciate now that the eye is such a very delicate thing that nobody but one who has studied a great deal about it and has proper instruments to test it should make an examination of it.

The examination is usually made by having one read various-sized letters at a distance of from 20 to 30 feet, as shown in the picture. Then another test is made by having much smaller letters read at a distance of from 15 to 18 inches. It has been found out at just what distance letters of a given size can be read by eyes that have no defects. When the letters cannot be read at the proper distance, then the oculist will make a test with glasses to determine what the trouble is. He knows that a certain shaped glass will bend the light outward, and so he directs that this sort of a glass be used to correct nearsightedness. Another shaped glass will bend the light inward, and this is used to correct farsightedness. To correct astigmatism one must wear a glass that is shaped differently in different parts.

Now you must appreciate that, if you have not had your eyes examined by an expert oculist, you ought to have it done at once. If you have a medical examiner in your school, he has probably told you whether you need go to an oculist. If he has said to you very recently—within a few months—that your eyes are sound and good because you can read letters at the proper distances with both eyes and with each eye singly and if you do not have headaches from use of the eyes, then you need not go to an oculist to have them examined. But you should have the medical examiner test them at least twice every year, or oftener if they cause you any pain or inconvenience, and you should

act upon his advice when he advises you to have an oculist go over your eyes very carefully.

REMEMBER: Sight is of more value to us than great wealth. Our welfare depends very largely upon good sight. To preserve our sight we should never allow intense light to fall directly into the eyes or on our books or desks. We should shade our eyes when we go out into intense light. We should not use the eyes in reading or other fine work in dimly lighted places. When we are reading, sewing, or doing any other kind of work by artificial light, the light ought to be placed behind us or above us, and it will be best to have it reflected from the walls rather than to fall directly upon the work we are doing. We should have our eyes examined by an expert oculist twice every year; and if he finds any defect, we should use glasses so as to save our eyes from strain which will injure them if it is not corrected.

HEALTH PROBLEMS AND PROJECTS

1. Is your schoolroom well lighted? How does the light enter the room? Does the sunlight ever fall directly upon your book or desk? Are all parts of the room lighted equally well?
2. Are the electric lights on the streets in the place where you live shaded so that people do not have to look at the light directly? Are the lights in the churches and other buildings you visit shaded? If not, what can you do about it?
3. At what distance do you habitually hold your book? How close to your desk do you keep your eyes when you are writing or doing any other work with books or pencils? Do any pupils in school keep their eyes too close to their books or their desks?

(1)

CARE OF THE EYES

Only one pair of eyes for life!

Dangers at Home



The Right Way



The Wrong Way

AVOID { Facing the light
Reading in the twilight
Reading when lying on the back
Using the "common" towel

Dangers at School



AVOID { Facing a window
Shiny Blackboards
Fine print or glazed paper
Non-adjustable desks
Rubbing eyes with dirty fingers

When the eyes water, blur or ache, or the school doctor reports defect, consult an oculist. Headaches, indigestion, and other troubles may be due to defective eyes.

HEALTH HABITS

4. How are the lights in your home arranged for reading and study? Does any member of your family ever read or study or sew or do work of any kind with light shining directly into the eyes? If so, what can you do about it?

5. Hold your pencil close to your eyes and describe your feeling. Then hold it as far away as you can and tell what happens. Explain the change in feeling when you look at a very near object as compared with looking at an object farther away.

6. Have you ever had a headache when you have been out in bright sunlight without having your eyes shaded? Explain.

7. Have you ever seen a mother wheeling her baby in a carriage directly against the sun without any protection for the baby's eyes? What would you want to say to such a mother if you should see her doing this?

8. How many pupils in your schoolroom wear glasses? If there are thirty or forty pupils and you are in the fifth or sixth grade, how many of them ought probably to wear glasses?

9. Is it a good thing to read a book with very fine print — much finer than that in which the text of this book is printed? What may happen to the eyes of one who has to read such fine print? Are there any books in your school that are printed in too fine type?

REVIEW QUESTIONS

1. Tell about the importance of good sight.
2. Why does our welfare depend upon good sight?
3. How can blind people go about? Can they ever learn to go about as freely as if they had good sight?
4. What is the *cornea*? What is its use?
5. What is the *pupil*? What is its use?
6. What is the *iris*? What is its use?
7. What is the *lens*? What is its use?
8. How does the eye adapt itself to the amount of light?
9. What happens when one looks directly into intense light?

10. Why does the pupil become very large in a dark room?
11. How does the lens adapt itself to near objects and to far-away objects?
12. How does the lens picture, or *focus*, objects upon the retina?
13. What may happen when one habitually keeps his eye too close to the work he is doing?
14. How does an oculist determine whether one has an eye defect?
15. What should one do when he has an eye defect?
16. How is one likely to suffer when he has an eye defect that is not corrected?

CHAPTER XVIII

CLOTHING THE BODY

Do you know that all machinery when at work makes heat? The working of the living machinery within the body creates heat. The harder it works the more heat it produces. If all the heat remained in the body, we should feel much too warm, as one does when he has a fever. So nature has arranged for the skin to carry off some of it through the perspiration and in other ways of which we shall learn later. It happens then that almost all the surplus heat of the body escapes through the skin.

One of the chief reasons for wearing clothes is to prevent the too rapid loss of this heat. Clothes in themselves furnish us no heat. They keep us warm, but they do so by helping to retain the heat of the body. The kinds of cloth which do this best make what we call the warmest clothing. For this reason we choose woolens for cold-weather wear. Linen, cotton, and silk, which permit the heat to pass away from the body much faster than wool, make cooler garments for summer use but are not warm enough for winter wear when one is out of doors. At the same time too much clothing makes the

skin very sensitive, and in this way one becomes subject to colds.

Just how much clothing one ought to wear depends upon several things:

1. How the skin has been trained. A skin that is kept healthy by cleanliness and the use of the daily cold bath requires less clothing than a neglected skin.

2. Age and health. Old people, babies, and persons in ill health, being less able to resist cold than others, require more protection by clothing.

3. One's habits of living. Those who live in warm rooms during cold weather need little if any more clothing while indoors than they wear in summer. Upon going out of doors, even if it be but for a few minutes' stay, additional garments should be put on.

4. While exercising we require less clothing than when inactive. Why?

5. The weather. We must vary our clothing to suit the weather. We ought not to make a rule that because it is summer we will wear thin clothing all the time or that since it is April we will leave off our winter under-clothing. Cold days occur in summer, and warm ones in winter. Even the warmest day of summer may be changed to a cool one in a few hours by a thunder shower. One ought to adapt his clothing to the weather regardless of the season.

When going out of doors in cold or wet weather, one should wear extra garments on the feet and legs as

well as on the upper part of the body. These should at once be removed on coming into the house.
Clothing for cold weather Outdoor wraps should not be so heavy as to tire one in wearing them, nor so warm as to cause perspiration. Several thin layers of cloth keep us warmer than one thick one of equal weight because between each garment and the next is a layer of air which helps to retain the heat of the body.

All kinds of clothing should be porous, that is, should permit the air to pass through. Chamois jackets and rubber raincoats, which we sometimes need to protect us from wet and cold, are air-proof and not suited for constant use. The perspiration from the skin, when there is no air to evaporate it, clings to the body and the clothing. After a raincoat which has been worn for some time has been taken off, the clothing is often so wet that the air will soon chill one. Unless one changes his clothing quickly or exercises until his clothing becomes dry, he may get a severe cold. Rubbers cause the shoes and stockings to become damp if kept on for a long time. They should not be worn indoors. On taking them off one should change to dry shoes and stockings if he has time for it. Rubbers after being worn should be dried before they are worn again.

If on the way to school you should be caught in a shower and your clothing should get wet, ask your
Wet clothing teacher to allow you to go home to make a change or to permit you to keep exercising until your clothes are dry. Even when sitting or stand-

ing, one may exercise vigorously by alternately contracting and relaxing the muscles of arms and legs.

If the feet get wet, the shoes and stockings should be changed as soon as possible. If the feet have been wet for some time and are cold, first put them in a bath of hot water for a few minutes until they are warm and well reddened. Lift the feet from the hot water, and splash cold water over them; then rub them dry with a coarse towel. Cold feet may also be warmed by first rubbing with cold water and then with a dry towel. Woodsmen sometimes warm their freezing feet by rubbing them with snow.

Probably it has never occurred to you that the color of a garment makes a difference in its warmth, but it does. If you have ever seen a polar bear, you ^{The color} know that its coat is white; and white is the ^{important} color of the fur of many other animals in the cold North. This is for protection from foes and also for warmth, as white garments are warmer in cold weather, except in the bright sunshine, than those of darker color. White and light-colored clothing are also cooler in



WHITE GARMENTS ARE WARMER IN WINTER THAN DARK GARMENTS. THIS IS ONE REASON WHY THE FUR ON A POLAR BEAR IS ALWAYS WHITE.

summer. People living in hot countries have learned this. Light-colored clothing is warmer in winter and cooler in summer than dark clothing for the reason that white or light colors reflect or turn away the heat of the sun and so protect us from overheating in summer, and they also protect us from cold in the winter by preventing the escape of the body heat.

We should be able to move as freely with our clothes on as without them. Clothing which is too tight to

Tight clothing permit the body to bend with ease in all ways is too tight to be worn. When children grow **harmful** fast, it often happens that their clothing, which of course does not grow with them as does the skin, gets so tight and small that it binds and squeezes the body most uncomfortably. Tight belts, tight collars, tight bands, tight waists, tight corsets, tight garters — all do harm. If one wants his body to serve him well, he must provide for it ample room in which to work.

The strong bones of the shoulders can bear the weight of one's clothing better than any other part of

The weight of the clothes the body. To have one's clothing hang from the shoulders is the best plan. To support

the clothing from the waist is hard on the body, for the weight of the garments thus becomes a constant drag upon the delicate organs within the body in the vicinity of the waist. And sooner or later these will get so pushed out of place that harm will result.

In order to keep the body clean one must of course

wear clean clothing. Garments worn next to the skin are very soon soiled by the perspiration. On this account the underclothing should be changed frequently, even though it may look clean. ^{Clean} ^{clothing} Garments that can stand boiling can easily be made clean. For this reason cotton and linen underclothes are to be preferred. In cold weather a thin cotton undersuit with a light one of wool worn over it makes a good combination. Heavy, closely woven cloth affords less warmth than light, porous clothing, besides being less healthful and comfortable.

Clothing worn during the daytime should be taken off at night and hung open to the air so that the moisture received from the body may dry out. Would it be best to hang it in a room other than the one in which one sleeps? Would it be proper to hang it in a closed wardrobe or closet where air cannot reach it?

Garments worn at night should be aired every day, and so also should the bed coverings, which are really a part of our night clothing. What do you think of the practice of rolling up the clothing worn at night and tucking it under the pillow during the day?

Underclothing absorbs more or less of the waste matter thrown off from the body; and even though aired daily, it becomes in a few days too soiled to be used again until made clean. When we lay such garments aside to await wash day, we should not leave them in heaps on the floor of the bedroom or clothes closet. Soiled clothing spoils the air of a room. Such clothing

should be kept in a bag or basket out of the living or sleeping room. Dresses and coats of cloth that hold dust should first be brushed and shaken out of doors before being hung in the clothes closet. Clean the shoes and rubbers out of doors before putting them away.

One depends so much upon his feet to support his body when he walks, runs, jumps, skips, skates, and climbs that he cannot afford to cripple their usefulness. So he must be careful how he clothes them. Many children prefer to go barefoot in summer. Would they go barefoot in winter, too, were it not for the cold? There are many people in warm countries who go barefoot all the time. They can walk very fast, and the soles of their feet become so hardened that they do not mind the rough roads. In Porto Rico, Mexico, and Egypt I have seen many old persons who had never worn a shoe.

The feet feel most comfortable when unshod. It is well to go barefoot indoors so long as one's feet are not cold. But it is not always safe to go out of **Shoes** doors without some kind of foot covering. In certain parts of the country the soil is unclean and full of the tiny *hookworms* that enter the body through the skin of the feet and cause a serious disease. In many places where children love to go, there is danger to bare feet from germs, from rusty nails, and from pieces of glass; so it seems wisest to wear sandals to protect the soles.

The proper shoe is one that has the shape of the natural foot. People often wear shoes that are too narrow or too short. Do you think it is sensible to do this? With high, narrow heels one cannot walk or stand gracefully, and the muscles are strained and injured. Shoes with very thin soles ought not to be worn in cold or wet weather. Why? Tight shoes cause cold feet. They also make *corns* and otherwise harm the feet. It is a good plan to use two pairs of shoes, wearing one pair one day and the other the next day. It costs no more to do this than to have but one pair. Shoes, like other clothing, get foul with body waste; and they should be given a chance to air and dry, so that they may be kept clean for wear. The stockings should be changed often and always dried and aired at night.

REMEMBER: Health and comfort demand that one should wear clean, dry, porous, and loose-fitting garments. Very tight-fitting shoes, collars, and the like should be avoided.



IF WE WEAR SHOES THAT ARE TOO NARROW OR TOO SHORT OR TOO TIGHT OR THAT HAVE TOO HIGH HEELS, WE SHALL BE UNCOMFORTABLE AND WE MAY INJURE OUR FEET. SENSIBLE SHOES ARE SHOWN IN THE PICTURE.

HEALTH PROBLEMS AND PROJECTS

1. Take outdoors a thermometer which registers below 50°. Put it next to the body, inside the clothing, and notice how quickly it rises. Where does the heat come from?

CARE OF THE FEET

From earliest infancy the little socks or shoes should not restrict the toes. Nature should be given the chance to shape the feet.

Children's feet



Not in
like the duck's



should go



Nor out
like the cormorant's

But straight like the Indian's

This will rest the weight of the body
evenly on the soles and prevent "Flat Foot"

Do your child's
feet have to
fit his shoes?



or



Do your child's
shoes
fit his feet?

Two-thirds of his life will be spent in his shoes.
See that he has a proper footing for life.

2. Put a piece of woolen and one of cotton cloth against the face or any part of the body. Which feels the warmer? Why?
3. Do you think people who wear heavy mufflers about the throat in winter avoid having sore throats? Why?
4. Why do we use storm windows in winter — to keep out the cold or to keep in the heat?
5. Why do some people use hollow tiles in the walls of their houses when they build them?
6. On a very hot day, people often put water on the face, hands, and neck and let them dry in the air. Why?
7. Why do we so often speak of *wet* days as *cold* days?
8. Feel a thick, hard-woven suit of underwear and a loosely woven, fluffy one; which feels the warmer? Explain.
9. Which is warmer, a heavy, hard quilt or a light, fluffy one? Why?

REVIEW QUESTIONS

1. From what source does the heat which makes the body warm come? Is the heat all kept in the body?
2. What are the best kinds of material to keep the heat of the body from escaping? What kinds permit the heat to escape readily?
3. Can the skin be trained to endure cold? How?
4. Why do many people take cold easily in winter?
5. How should one dress when going out in cold or wet weather?
6. What is the objection to wearing raincoats, rubbers, and very thick, heavy clothing all the time?
7. Does the color of clothing make any difference in regard to its warmth or coolness?
8. What is the objection to wearing tight belts or collars or bands?
9. What is the best cold-weather combination in underclothing?
10. What should be done at night with clothing worn during the day?
11. Why should one be careful to clothe the feet properly?

CHAPTER XIX

PROTECTING THE BODY'S HEALTH

NEARLY all dangerous bacteria come from the bodies of the sick. They get into the air and into the water and into the food in various ways. If one **Germs** then breathes the air or drinks the water or eats the food that contains bacteria, he too may become sick with the kind of disease they cause. Diphtheria, typhoid fever, smallpox, measles, whooping cough, infantile paralysis, pneumonia, tuberculosis, cholera, and grippe are the names of some of these diseases. They are all "catching," or *contagious*, diseases. Each is produced by a special sort of germ. The kind that causes one disease will not make a person sick with any other disease.



EACH CONTAGIOUS DISEASE IS CAUSED BY A SPECIAL KIND OF GERM.

All these diseases are dangerous, and they should be avoided as one would avoid a lion or any other fierce animal. When anyone is sick with a contagious disease, all persons who are not needed to give him proper care should keep away from him.

Most towns and cities have one or more persons, called *health officers*, whose business it is to try to pre-

vent these diseases from spreading. When anyone is ill with a dangerous disease, like diphtheria, measles, scarlet fever, typhoid fever, or smallpox, the health



NO ONE BUT A PHYSICIAN, NURSE, OR HEALTH OFFICER CAN EITHER ENTER OR LEAVE THIS HOUSE WHILE THE DIPHTHERIA PLACARD REMAINS ON IT. WHY?

officer puts a sign on the house where he lives. When people see that sign, they know it to be a warning, and they should keep away.

A woman whose little daughter had scarlet fever did not want a sign put on her house; so she told no one what ailed the child. Other children came to the house. The little girl, not being very ill, was permitted to play

with them. A few days afterwards several of these children became very sick with scarlet fever. It cost their parents much money to provide the care their illness required. They missed school and all the good times their playmates were having. One child lost his hearing as a result of his illness, and each one suffered to a greater or less degree — all for the lack of a card which would warn people that there was a dangerous disease in the house!

It is our duty to do all we can to protect others as well as ourselves from disease. When a case of contagious disease occurs in a home or school, it should be promptly reported to the health officer. In many places there are laws which make it a crime not to do this. Is this the case in your town or city?

Scarlet fever, measles, whooping cough, mumps, and chicken pox are often called *children's diseases*. When once a child has recovered from one of these diseases, he rarely has it a second time.

Scarlet fever is the most dangerous disease of childhood. It is very likely so to weaken the body that other serious diseases follow it either at once or later in life. Injuries which result from it often last throughout the rest of the patient's life. The eyes or ears are often so seriously injured that partial or complete blindness or deafness is produced. Even mild cases are dangerous. One who has it must be given the best care. This is not always possible at the child's own home. In many places special hospitals are provided

for the care of those ill with contagious diseases. This helps the sick and likewise protects well persons.

Scarlet fever is spread by discharges from the throat and nose and by scales which fall from the skin. Generally it takes six weeks for a patient to get so well that there is no danger of his giving the disease to others.



MARY IS SICK WITH A DISEASE WHICH SHE CAUGHT FROM A PLAYMATE.

Even though the patient feels quite well, it may not be safe to allow him to mingle with his playmates because he may still carry with him some living scarlet fever germs which might give rise to the disease in others. So a person who has had scarlet fever must wait until he is released by the health officer before coming into contact with others.

Scarlet fever germs may be carried from a sick to a well person on clothing, books, papers, and things worn or handled by the sick person; they may lodge, too, in the room where the sick one has been cared for. To prevent the spread of the disease these germs must be completely destroyed.

Measles is another dangerous disease against which the same precautions are necessary as in the case of scarlet fever. It is spread in a similar manner. It may leave behind it also a whole train of dread diseases.

It is very important that children should avoid every contagious disease. A sore throat is likely to be the first bad feeling in the case of scarlet fever and some other serious diseases. It is wise to beware of any person with a sore throat.

The mouth is the gateway through which many germs get into the body. Some germs leave the bodies of the sick through this same gateway. Do you think it a wise thing for people to kiss one another on the mouth unless they are sure that no germ disease can be spread thereby? Do you think it right to allow all sorts of people to kiss a baby?

When a sick man drinks from a public drinking cup, he may leave disease germs from his mouth on the rim of the cup. Then a little girl comes for a drink, and the germs get a fine chance to slip into her mouth while she is drinking.

If you are thirsty when at play, go to one of the bubble fountains from which you can drink without a

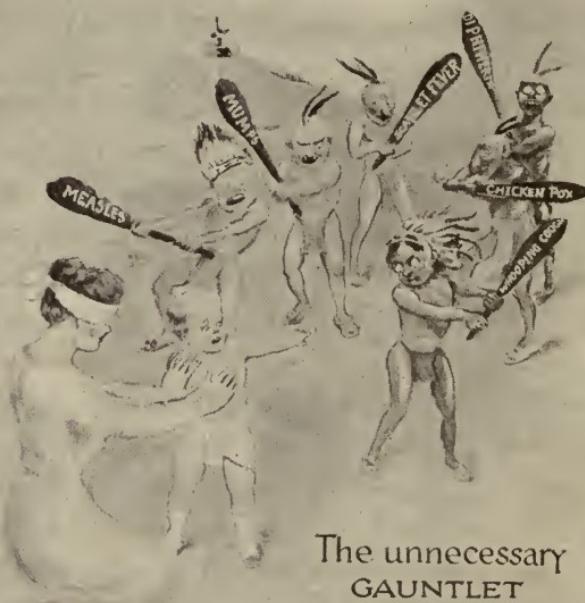
cup. If necessary drink from the hand or make a cup from a piece of clean paper, but do not drink from a public cup or glass. All cups used in public places must be dipped in boiling water every time they are used to make them safe. The glasses at restaurants and soda fountains are often not cleansed sufficiently to make them safe. Should you always take your own drinking cup to school with you? Why?

Suppose that when you get to school you find that you have forgotten your pencil. Should you borrow one from a classmate? Suppose you borrow one from a pupil who has a habit of putting his pencil in his mouth, and suppose you have the same habit. What may be the result? Diphtheria and other germs have been found on pencils.

Think over this case: You go into a public library and sit down to read in the children's room. The first book you pick up has dirty thumb marks on the pages. There is a boy near you, wetting his thumb in his mouth every time he turns the pages. You say: "This is not a nice habit. It makes the book dirty." But is this the worst thing about the boy's dirty habit? Five thousand bacteria were found sticking to the leaf of a book from one thumb that had been wet with saliva. Might they pass from the book to your hands as you turn the leaves? What should one do in a case like this?

From door knobs, car rails, straps, and other things that everybody touches you may gather disease germs

COMMUNICABLE DISEASES



The unnecessary
GAUNTLET

It is not necessary for children
to have any of these diseases

They all pave the way for more serious
troubles such as tuberculosis, deafness,
blindness, kidney disease.

An epidemic is a disgrace to a community.

on your hands. If you are in too much of a hurry to wash your hands before dinner, you may give the germs a good opportunity to pass into your mouth with your food. Is it well to keep the hands away from the mouth and not rub them over the face? Why? Sore eyes and pimples on the face may come from hands that have bacteria on them.

A man with disease germs in his mouth spits in the street. A little boy comes along and gathers up some of the germs with the dirt which clings to his boots. When he goes home, he does not stop to wipe his boots on the doormat. He goes into the sitting room, and some of the dirt on his boots is wiped off on the rug. His little sister is playing on the floor. The germs get on her hands; she puts her finger in her mouth, and the germs go with it. What may be the result of this?

When people have certain diseases, they distribute disease germs wherever they go unless they are very careful. A great many germs are scattered about by people spitting on the sidewalk or in public places. This is so dangerous that in some towns and cities there are laws against spitting and persons who are caught expectorating on the walk are fined or put in jail. In cars and public buildings you may often see the sign: "Don't spit." Is this a rule everyone should obey even if there are no laws forbidding it?

Formerly no one knew that colds and influenza were contagious, but now it is known that, while sneezing and coughing, a person with a cold sends out into the

HEALTH HABITS

air around him little drops of moisture full of germs which those near him may breathe in and so get the same disease. This is the case when one has influenza. Quite often children have these diseases; and although they do not feel so well as usual, they continue to go



THIS IS A GOOD PLACE FOR THE BREEDING OF DISEASE GERMS.

to school. What do you think is likely to happen to the other children?

Here is what did happen in a school I know about. It was at a time when influenza was very common. There were over a thousand pupils who attended the school. On one floor this plan was carried out: As

soon as a child in any room showed signs of influenza, he was sent home, and at night that room was cleaned in a way that left no germs behind. As a result less than two dozen of the pupils on that floor took the disease. On the other floor no such care was taken, and about two thirds of the children suffered with influenza.

From a single case of a contagious disease, if it is not well guarded, there may follow hundreds of cases. Two boys I knew had whooping cough. They did not feel very sick. It seemed too bad for them to miss their lessons and get behind in their classes; so their parents allowed them to go to school. Very soon nearly all the children in that school who had not already had it caught the disease. Should those boys have been kept at home? Why? Whooping cough kills 10,000 children in the United States every year. Those who do not die from it are likely to have their bodies so weakened by it that they will be unable to resist pneumonia and tuberculosis. Do you think anyone having such a serious disease would be willing to be the cause of other people catching it?

Sometimes one sees the people in an audience waving their handkerchiefs to express their pleasure at what a speaker has said. If the handkerchiefs have been used, they will be likely to contain germs from the nose and mouth. Each wave of the handkerchief may send out into the air a little shower of disease germs. It is important to change one's handkerchiefs often even

when one is well. Why? Should one ever flourish a soiled handkerchief in the air? Sick persons should use paper handkerchiefs that can be burned. Why? The Japanese, who are very clean in their habits and very healthy people, always use paper handkerchiefs. The discharge from the nose when one has a cold very quickly makes a cloth handkerchief so moist that it is of no further use. A girl I once knew used to dry her handkerchiefs on the steam coils so that she could use them a second time. Do you think that is a safe thing to do? Is it wise to wipe the eyes with a handkerchief that has been used for the nose? Those who care for babies frequently use their own handkerchiefs for the little ones. Do you think this a safe plan?

Probably the disease that kills more persons than any other is consumption, or *tuberculosis*. It is so

Tubercu- common that in this country one person dies
losis, the from it every few minutes. Tuberculosis
deadly dis- most often affects the lungs, although it also
ease occurs in other organs of the body. When

the lungs are diseased, the sick person coughs and sometimes raises much foul matter. This swarms with the germs that are the cause of the disease. If this falls upon the floor, carpet, or bedding, the germs get into the air of the house, and whoever breathes it may also get tuberculosis.



TUBERCULOSIS
GERMS.

If the *sputum* (disease matter from the lungs) is discharged upon the ground or sidewalk, it is

likely to be trodden under foot and thus carried about, distributing germs in new places. Tuberculosis germs are scattered, too, by the tiny drops which are sprayed out into the air every time a sick person coughs or sneezes.

Whatever a person suffering from tuberculosis eats with or in any way uses about his mouth is sure to carry germs unless it is thoroughly cleansed. As likely as not too, when a sick person spits upon the floor or sidewalk, flies walking over the discharge may get it on their wings and feet and so may carry some of the germs along to the next person or thing upon which they alight.

With all these ways of distributing the germs of tuberculosis, see how easy it is for a well person to get them from a sick one, if the latter is not most careful.

Care in promptly destroying all germs that come from consumptive persons would save thousands of people every year from getting this disease. Preventing Careless people who are ill with tuberculosis ^{tubercu-} are to be feared. Sometimes it happens that ^{losis} neither sick people nor their friends understand about the precautions needed to protect well people. So you see it is most important for everyone to know about this disease and how to prevent its spread. When tuberculosis germs are breathed into the lungs of a perfectly healthy person, they are likely soon to be killed by the wonderful white blood cells of which we have

already learned. It is the one who is out of health or run down from one cause or another, such as lack of proper food or of sleep or of fresh air, who most often gets tuberculosis. The use of alcohol and tobacco, because they weaken the body, makes one very liable to catch tuberculosis if he breathes in the germs. The surest course to pursue in order to avoid getting tuberculosis is to practice health habits and to keep the body so well and strong that it can resist disease. Mention the health habits that will protect the body from this disease.

The tuberculosis germ has a good chance to gain a hold in the body when a person has a cold. It is wise therefore never to neglect a cold. Taken at the beginning, tuberculosis can be cured. Rest, good food, outdoor air, and sunshine, in the majority of cases, bring about a cure. Physicians say the best thing to do is to live out of doors in the open air and sunshine all the time. Why should this be good for a person sick with tuberculosis?

REMEMBER: One who has a cough for a long time ought to have an examination made. The health department in most cities will make an examination free of charge. It is very important for one who has tuberculosis germs to find it out as soon as possible so that he may take steps to be cured. He should find it out, too, so that he may protect those among whom he lives and thus make himself a safe person with whom to work or play.

HEALTH PROBLEMS AND PROJECTS

1. Place a piece of glass about four inches away from your mouth when you cough or talk loudly, and notice whether anything appears on it. Explain.
2. Suppose your classmate has a "cold in his head" and sneezes often very near you. Are you in any danger?
3. Find out what the Board of Health or the physicians or the people in the place where you live are doing to get rid of some catching disease.
4. Has your school ever been closed on account of an *epidemic*? If so, what was it? Why was the school closed?
5. Suppose you knew of a family in which there was a case of scarlet fever, but the family would not tell physicians about it in order to avoid being *quarantined*. What would you do? Why?
6. Should every well person help the health officers as much as he can to prevent people from spitting on street cars, sidewalks, in public buildings, etc.? Why?

REVIEW QUESTIONS

1. From where do the bacteria that make one sick first come?
2. How are they carried from one body to another?
3. What are some of the diseases caused by bacteria?
4. What may happen to well children playing at the house of a child who has such a disease as scarlet fever?
5. What is the gateway through which many germs enter the body?
6. Why is there danger in using a public drinking cup?
7. Why is there danger in children's using the same lead pencil? In eating food without first washing the hands? In rubbing the eyes with the hands?
8. Why is there danger to pupils in school from a child who has a hard cough?

9. Why is there danger from people's waving handkerchiefs about in the air?
10. What is the disease known as *tuberculosis*?
11. How is tuberculosis spread among the people?
12. What care should one who is suffering from tuberculosis take?
13. What do the white blood cells do to save one from tuberculosis and similar diseases?
14. How should one live in order to keep his white blood cells in good condition?
15. What kind of living may weaken one so that he cannot fight tuberculosis and other diseases?
16. How can one find out whether he has tuberculosis?
17. In which of the two rooms shown in the picture would you be less likely to get tuberculosis?



CHAPTER XX

COMMON ACCIDENTS; SAFETY FIRST!

ALL persons are liable to meet with accidents. To know what to do and how to do it, in case of accident, may sometime save a person's life. In most cases the need for prompt action is so great that one should apply his own knowledge first, if no other aid is near and he knows the right thing to do, and then call an older person, a doctor if possible.

Last summer, while a crowd of boys were playing together in a field, one of them ran against a scythe, which had fallen from the limb of a tree where it had been hung; and it cut a long, deep gash in his leg. The wound bled very fast. As the boy was a long distance from home, he was in danger of bleeding to death. One of his companions, a lad of fourteen, pulled out his handkerchief, folded it crosswise, and tied a knot in the middle. He put into the knot a small pebble. Then he bound it as tightly around the leg as he could so that the knot came just *above the cut* but not *over* it. After tying the handkerchief, he passed a lead pencil underneath on the side opposite the first knot and twisted it

How to
make a
wound
stop bleed-
ing

round and round to make it tighter. This soon checked the bleeding.

Some of the boys then made a "chair" with their hands and carried their companion to the nearest house. A surgeon was summoned to mend the cut blood vessel.



HOW TO STOP A WOUND FROM BLEEDING. NOTE THAT THE KNOT IS TIED JUST ABOVE THE CUT, WHEN AN ARTERY IS CUT, AND THAT IT IS MADE VERY TIGHT. WHERE SHOULD THE KNOT BE TIED WHEN A VEIN IS CUT?

For the time being the *tourniquet*, as it is called, made with the handkerchief, had stopped the bleeding. But it would not be safe to leave anything so tight on a leg for a long period, not over an hour at the most. Why?

A short time after this incident, one of a group of

schoolboys, in a scramble to be first to get a ball with which they were playing a game on the school grounds, cut his arm badly on a barb of a wire fence. The blood flowed from the wound in a stream. A playmate who had seen the treatment given to the boy who had cut his leg tried to stop the bleeding in the same way, but without success.

"Tie a handkerchief both *above* and *below* the cut," advised their teacher, who came out to see what was the matter.

This was done and the bleeding stopped.

"But I'm sure that's not the way it was done the other time," said the boy.

"True," replied his teacher, "but then an *artery* had been cut. This time it is a *vein*."

"Well! how is one going to tell which is which?" asked the boy.

"By just this," said his teacher: "*The blood from an artery is bright red and comes in spurts with each heart beat. The blood from a vein is of a darker color and flows in a steady stream.*"

In the first case, if nothing with which to make a bandage had been at hand, the bleeding might have been checked by placing the thumbs directly opposite each other *just above the cut, between it and the heart, and pressing hard.* The pressure must always be kept up until a surgeon arrives to give the injury attention.

Nosebleed may generally be stopped by holding the head erect, reaching both hands high above it and, at

the same time, taking several deep breaths. Put a basin under the chin to receive the blood, or press the corner of a dry handkerchief into the bleeding nostril. If the bleeding is very bad or is not readily stopped, a physician should be called.



ONE WAY TO STOP NOSEBLEED.

Stuff a little roll of cotton high up in each nostril; then firmly pinch the soft portion of the nose, pressing hard against the bone as high up as possible. Hold the head high. Nearly every nosebleed may be stopped by this method in ten or fifteen minutes. The pressure must be continued long enough to allow the blood to clot. The cotton should be left in place for two or three hours, or overnight. Other-

wise the bleeding may return. If you know positively which side of the nose the blood comes from, it is not necessary to put cotton in the other side.

Frosted feet should be dipped alternately in hot water and cold water. The cold water should be of ordinary

temperature and the hot water should be from 105 to 110 degrees F. The feet should remain about a quarter to a third of a minute in the hot water and half as long in the cold water. Repeat the dipping ten or fifteen times. Do this every night and morning, and in a few days the difficulty will disappear.

For frosted
feet or chil-
blains

Two sisters were standing near an open fire early one Christmas morning, taking the gifts from their stockings. Suddenly the dress of the younger one caught fire. Before even the girls were aware of it, the flames shot above the child's head.

"Lie down on the floor! Lie down quick, Nettie!" urged the older girl, who remembered that flames always rise upward, and who knew that if Nettie remained standing the flames would have a good chance to burn her seriously. While Nettie, who was terribly frightened, hesitated as to what to do, her sister threw her to the floor and, grabbing an Indian blanket from the couch, drew it closely about Nettie's neck, afterwards wrapping it tightly around her from head to foot. Then she lifted a corner of the floor rug and, rolling Nettie over and over in it, wound it snugly about her. She acted so promptly that before their parents reached the scene the fire had been smothered.

Nettie was unharmed, save for the singeing of her hair and a few slight burns. The brave little rescuer had really suffered the greater harm. In the excitement of the moment she had not thought of herself.

When, however, the danger was past, she realized that her hands had been burned in several places. As the skin was still whole, her mother wet pads of cotton in *picric acid* solution and bound them over the burned places to relieve the pain. If she had not had picric acid, she would have put a heaping teaspoonful of baking soda in a pint of tepid water for the little girl to keep her hands in. It would have been just as well to put several thicknesses of soft cloths, wet in the soda water, on the burns. Tepid water alone, without any soda, will ease the smarting from a burn; but contact with the air always increases the pain.

If the skin had been destroyed, something that would have covered the entire surface and protected it from the air would have been needed. White vaseline is good for this purpose. A specially prepared paraffin obtainable from a druggist is better.

The Fourth of July is a day of good times and festivities. Yet it is a sad fact that more boys and girls are killed or maimed for life on that day than on any other during the entire year. In 1910 over five thousand individuals in the United States, many of them children, met with Fourth of July accidents, resulting in a loss of life or injury to some parts of their bodies. Just think of thousands of persons, more people than are wounded in some battles, each losing an eye, a thumb, a hand, an arm, a leg, or even life on a day of celebration! In 1920 there were not more than one third as many accidents as in

**Fourth of
July acci-
dents**

1910 because in most cities and towns the authorities had already forbidden the sale of giant crackers, toy cannons, and similar articles. Is this wise?

The dreadful disease called *tetanus*, or lockjaw, often follows Fourth of July injuries. Bacteria very commonly found in dirt are the cause of it. These may be carried into the wounds on bits of soiled clothing or other dirty material. This is likely to happen to jagged wounds on the hands or feet made by gunpowder. Now you can see why it is so necessary to cleanse a wound with special care. Other bacteria, too, besides the tetanus germ, are likely to make their way into the blood through any broken place in the skin.



EVERY YEAR, MANY PERSONS ARE SERIOUSLY INJURED
IN FOURTH OF JULY ACCIDENTS.

Lockjaw may also result from the breaking of the skin by stepping on a rusty nail or a dirty piece of broken glass. Fortunately there has been discovered an *antitoxin* which, if given in time, may prevent this dreadful disease. It is safer to run no risks. When a wound is made by anything likely to convey the germ, a physician should be called to give antitoxin.

To remove a splinter Every person knows how annoying a splinter or a thorn in the flesh is. Even a very little thing like this may cause considerable suffering if not

promptly removed. The best way to remove a splinter is to pull it out with a pair of small pliers or tweezers. To dig it out with a pin or needle may tear the flesh. When there is nothing else at hand a needle may be used; but first hold it for a few seconds in the flame of a candle



THE BEST WAY TO REMOVE A SPLINTER IS TO PULL IT OUT WITH A PAIR OF SMALL PLIERS OR TWEEZERS.

or a burning match to make it *sterile* (free from germs). Even so small a wound needs to be cleansed in soap

and water, then painted with tincture of iodine and protected by a dressing from dirt and germs. We cannot be too particular with wounds upon the hands and upon the feet if we go barefoot. These members come so often in contact with dirt and dirty things that, when the skin is broken, dangerous germs may get in.

Let us look now at another kind of accident. Several girls were recently playing in an over-warm room when one of them fainted. Her frightened companions laid her upon a lounge, piling the pillows high under her head.

The treatment of a person who has fainted

"Oh, not that way!" cried one of the group, who had studied such matters; "open the windows and give her air. Take out the pillows and help me to put some books under the foot of the lounge to make that end higher. Wet her face and neck with cold water. We must loosen her clothing too," she added, as she began to unfasten her collar and waist. With this treatment the color came back to the girl's face very shortly, and in a few minutes she had quite recovered.

"Why did you lower her head?" questioned some one.

"Because," replied the girl, "when a person faints, a large share of the blood has left the brain, and we want to do everything we can to bring it back again. Unfastening the clothing helps; and besides, it makes it easier for the person to breathe. When a person feels very faint the best thing for him to do is to sit in a chair and bend forward, bringing his head as low as possible. If it had been sunstroke, though, the right

thing to have done would have been to raise the head as high as possible because in that case there is too much blood in the head."

"But how can one tell them apart?" was asked.



WHEN ONE HAS FAINTED, THE BLOOD HAS LEFT THE BRAIN, SO THE HEAD SHOULD BE PLACED ON A LEVEL WITH OR LOWER THAN THE FEET.

"Why, a person who has fainted is very pale, while a person with too much blood in the head has a flushed face," was the response.

For sunstroke, which is a very serious thing, a doctor should be called at once. While waiting for him, one can help by putting an ice bag on the victim's head and bathing the face and chest with cold water.

Here is another accident: A creeping baby swallowed a button which lodged in his throat. His mother, frightened by his choking, was unable to do anything for his relief. A guest quickly suspended the child by his feet, gave him a vigorous shake, with a sharp slap on the back, and the button flew out of his mouth.

When something lodges in the throat, eye, or nose

When anything pointed, jagged, or sharp, as a pin or a fishbone, is swallowed, the wise thing for a person to do is to eat a full bowl of corn-meal mush *without milk* or a large quantity of mashed potato or soft bread in order to distend the intestine so as to make it possible for the object to move along the food tube.

If you should ever have the misfortune to get sand or dirt in your eye, remember not to rub it. Often the tears will wash out the dirt. Sometimes closing the eyes tightly and blowing the nose hard is sufficient. Drawing the upper lid away from the eye and gently stroking it in a downward direction is another good thing to do. If none of these methods succeeds, some one who understands how to do it should be called upon to remove the sand or cinder with the twisted corner of a handkerchief. Particles which have become stuck in the eye must of course be removed by a physician.

Small objects in a nostril, if not crowded up too far, may generally be removed by putting a finger upon the other nostril so as to close it, keeping the mouth shut meanwhile and blowing the nose hard.

A bruise caused by a blow received upon any of the soft parts of the body, a stubbed toe, or a jammed finger are best relieved by a hot *fomentation* applied to the injured part. A fomentation consists in applying cloths wrung out of very hot water.



REMOVING A CINDER FROM THE EYE.

it by the ends, and dip the center in the hot water. By twisting the ends, the hot water can be squeezed out without touching it with the hands. A dry flannel cloth should be laid next to the skin, the hot wet cloth should be laid above that, and the whole should be covered with another dry flannel cloth. As soon as the wet cloth ceases to feel hot, it must be reheated in the

Bruises

Flannel cloths are best for this purpose. Pieces of an old flannel undergarment, two or three woolen stockings, or a piece of an old shawl may be used if soft flannel cloth or a woolen blanket are not convenient.

Have the water near the boiling point. The cloth should be somewhat larger than the part to be treated. Fold the cloth so as to get the right width, but about twice the needed length. Grasp

hot water. Repeat this for fifteen minutes. Then remove the hot cloths and, for the finish, apply one wet in very cold water. Carefully dry the parts afterwards. For toothache this treatment will generally afford relief.

For bites and stings from common insects bathe the parts in salt and water or a strong solution of soda. When a sting has been left in the wound, it should be withdrawn. Why? Bites and stings

One August day, not long ago, several boys who belonged to a Boy Scout company were picking berries in a huckleberry swamp, when one of the number who was barefoot was bitten by a rattlesnake. Telling some one else to run for aid, the oldest lad in the group picked the boy up in his arms, carried him a short distance to a safe spot on drier ground, and, pulling off his necktie, bound it tightly about the wounded leg between the bite and the heart. Breaking a short twig from a tree, he fixed a tourniquet and twisted it until the necktie was tight enough to shut off the circulation. With his pocket knife, he made two quick cuts, crossing each other in the flesh over the wound and going in just a little deeper than the snake's fangs had gone. Then squeezing the wound to make the blood flow, he put his lips to it and sucked it vigorously, spitting out the poisoned blood as it came. Why did he do this unusual thing?

You will be interested to learn that it saved the boy who was bitten. Of course no one with sores on

his lips could with safety do such a thing. Why? It would do no good to suck the wound made by the fangs of the snake without making the wound bigger, because the fangs do not leave an opening in the flesh any larger than would a fine-pointed needle, which is altogether too small for the poison to be drawn out.

It was most fortunate for the boy that he kept perfectly still after he was bitten. If he had become excited and run home, as boys are likely to do at such times, his blood would have flowed more rapidly, and then it would have carried the poison more quickly throughout his whole body. I suppose you know that the venom of a snake is very poisonous. To keep it from circulating in the body is the one thing to do when a person is bitten.

It is well to bathe the wound thoroughly with water. Some *permanganate of potash* dissolved in the water until it becomes a deep wine color is still better for bathing the wound. The very best way is to rub the crystals of permanganate of potash right into the wound as quickly as possible and to keep it covered with a pad wet with a solution made of some of the crystals dissolved in water.

It used to be believed that a dose of whisky should be given to cure a snake bite. A few years ago a physician (Dr. Ellis Allen) proved by a series of experiments, in which small animals were given the snake poison of the copperhead moccasin, that whisky has no value whatever as a cure. Rats given the whisky died

earlier than did rats of the same size that had no whisky, although all were given the same amount of poison.

It is well-nigh impossible for snakes to drive their fangs through rubber; so it is a good plan to wear rubber boots when one must walk or work in places which snakes frequent. In addition one should always carry at such times a dram or two of permanganate of potash crystals ready for use.

In the chapter on "Health Habits in Breathing" (Chapter IX) instructions were given for the treatment of drowning persons. You should read again pages 85, 86, and 87, so that you will be ready to help a person who may have had an accident in the water.

Wash small flesh wounds with hot water, using soap if the parts are very dirty or soiled with oil or grease. Paint with *tincture of iodine* (which is a very valuable remedy for all small flesh wounds of every kind and should always be kept where it can be used quickly when needed) and apply a light, clean bandage. Use firm pressure to stop bleeding if necessary. If the parts are badly bruised and there is much pain, soak in hot water for ten or fifteen minutes or until the pain is relieved. Repeat if necessary. Paint again with iodine after soaking.

If you wrench or sprain your ankle so that walking is painful, it should be allowed to rest for a few days. Soak the foot in hot water for fifteen minutes three times a day. The water should be as

hot as can be borne (105 to 110 degrees F.). After two or three days the ankle should be gently rubbed with oil twice a day. Use the ankle carefully for a time.

Heat applied in some form is a wonderful remedy for pain. Heat kills pain. It is much better to relieve pain by means of heat than by the use of

**For pain in
any part
of the body** medicines, and whenever possible this simple method should be used. Parts like the hands

and feet, when aching, may be immersed in hot water. The water must be more than warm; it must be at least 105 to 110 degrees. The heat may be increased after a minute or two by the addition of more hot water. When other parts of the body are the seat of pain, fomentations may be applied as described on page 232. Usually three or four applications are sufficient to relieve ordinary pains. The parts should be well covered to keep them warm after the hot application has been made. If chilling occurs, the pain will quickly return. A rubber bag filled with very hot water is sometimes more convenient, though less efficient, than the fomentation. Heat may also be applied by means of strong electric light, by hot sand bags, heated bricks, or other heated objects.

We have become so accustomed in infancy and childhood to being cared for and protected by our parents

Safety first and other older persons that we often neglect to form those habits of carefulness that are necessary for our protection amid the multiplying dan-

gers with which we are surrounded, especially in the crowded streets of a great city.

Safety first is an excellent motto. Take no unnecessary risks.

If you are in a hurry or feel an impulse to dash



THROUGH CARELESSNESS MANY PERSONS ARE KILLED OR MAIMED FOR LIFE
EVERY DAY BY AUTOMOBILES.

across the street although you see an automobile coming only a few feet away, don't do it. Wait. A few In ten seconds the automobile will have gone don't's to be by, and you can pass safely. You might have observed crossed safely a few feet ahead of the automobile, but suppose you had stumbled or become bewildered or a

drunken or reckless driver had increased his speed. You might have lost a leg or an eye or your life.

In crowded cities do not attempt to cross a street anywhere except at the regular crossings, and then watch the policeman's signal and cross when other



EVERY DAY MANY PEOPLE ARE INJURED BY GETTING ON OR OFF MOVING STREET CARS.

people do. The hundreds of automobile accidents which are happening every day are chiefly due to neglect to follow well-known traffic rules.

Always "look before you leap," especially when alighting from a street car. There may be an automobile or another street car coming toward you. There

is always somebody about who is likely to violate traffic rules and thus endanger your life. Never get off or on a moving street car.

Don't allow a foolish boy or girl to "dare" you into doing perilous things.

Don't go into deep water until you learn to swim. It is not necessary to run any risk of drowning before you have learned how to keep yourself afloat. Don't swim until at least an hour after eating.

Don't keep matches about unless they are safety matches. All other kinds are dangerous.

Don't take any chances with fires; there is great loss of property and human life every year because of fires due to carelessness.

Don't use any kind of light where there is gasoline. Many people are maimed or killed every year because they are careless about this.

Don't put kerosene oil on a fire or use it near a lighted candle. If you do, you are likely to suffer serious injury.

Don't "fool" with firearms. Never keep loaded firearms. The "didn't-know-it-was-loaded" excuse won't restore the finger you have shot off or bring to life a playmate whom you have accidentally killed.

Don't taste the contents of an unlabeled bottle to find out what it is. You have never heard of a monkey's dying of accidental poisoning. The monkey carefully investigates everything before he swallows it. If there is anything dangerous about it, he finds it out

before it is too late. We can learn some useful lessons from these humble creatures.

Don't throw banana skins or nutshells on the sidewalk or on a floor where you or another person may step on them.

Serious accidents occur from this cause.

If you don't know the water is pure when you are on a hike in the country, do not drink it until it has been boiled. This will make it safe.

If you don't know the milk is clean and free from typhoid and other dangerous



MANY PEOPLE LOSE THEIR LIVES THROUGH CARELESSNESS WITH FIREARMS.

germs, take it boiled instead of raw. This will make it safe.

Don't "lose your head" in case of an accident. If danger threatens, keep cool, ready to act with promptness and good judgment. In doing this you need not become a coward, afraid to make any move lest some harm should come to you. One who trains himself to

carefulness will be safe under circumstances in which a careless person would be running great risk.

REMEMBER: To know what to do in case of an accident is very important; but it is even more important to prevent accidents by using knives and all other sharp instruments, firearms, and explosives in a cautious manner. To pour kerosene on a fire, to fill a kerosene lamp or a gasoline stove while either is burning, to take a lamp or candle or any sort of flame into a room where gasoline is being used for cleaning or where a gas pipe is leaking is to invite accidents. But one ought occasionally, in order to gain practice, to imagine that an accident has occurred, and then see how quickly and effectively he can treat it. In this way he may be ready, when a real accident does occur, to treat it properly.



HEALTH PROBLEMS AND PROJECTS

1. What accidents are likely to happen to people on the street any day?
2. In accidents which result in bleeding, should the treatment be applied *always* between the cut and the heart? Why?
3. In most of the wounds you observe, does the blood flow from an artery or from a vein? How can you tell?
4. Have you ever had an accident to the skin which left a *fester*ing sore? Why should this have happened? Could it have been prevented?
5. In wiping off blood from a cut, is it right first to moisten the cloth in the mouth?
6. What are the traffic rules in your city? How does the policeman let you know when to cross the street?

REVIEW QUESTIONS

1. What is a *tourniquet*? How is it used?
2. What is the color of blood that flows from an artery? From a vein?
3. Where should pressure be applied in order to stop bleeding when an artery is injured?
4. Where should the pressure be applied when a vein is injured?
5. What is a good way to stop bleeding when a cut is not very severe?
6. How should a wound be treated when it is made by broken glass? By a nail?
7. What is a good way to stop nosebleed?
8. What should be done when the skin is burned?
9. What accidents are likely to happen from the use of giant crackers, toy cannons, and similar articles?
10. What should be done to a wound when the bleeding stops?
11. How should one disinfect his hands if he is going to touch a wound? Why is this necessary?
12. What is the disease called *lockjaw*? How is it caused?
13. What has been discovered that helps to cure lockjaw?
14. How should a splinter or thorn be removed from the flesh? Would it be well to dig it out with the point of a needle?
15. Why must care be taken with cuts or bruises on the feet?
16. What should be done when a person faints? How can you tell when a person has fainted?
17. What should be done when one suffers from sunstroke?
18. How should one get sand or dust out of the eye?
19. How should small objects be removed from the nostrils?
20. What is a *fomentation*?
21. How can a fomentation be used to help a person who has had an accident?
22. Is getting off a street car ever dangerous? Why?

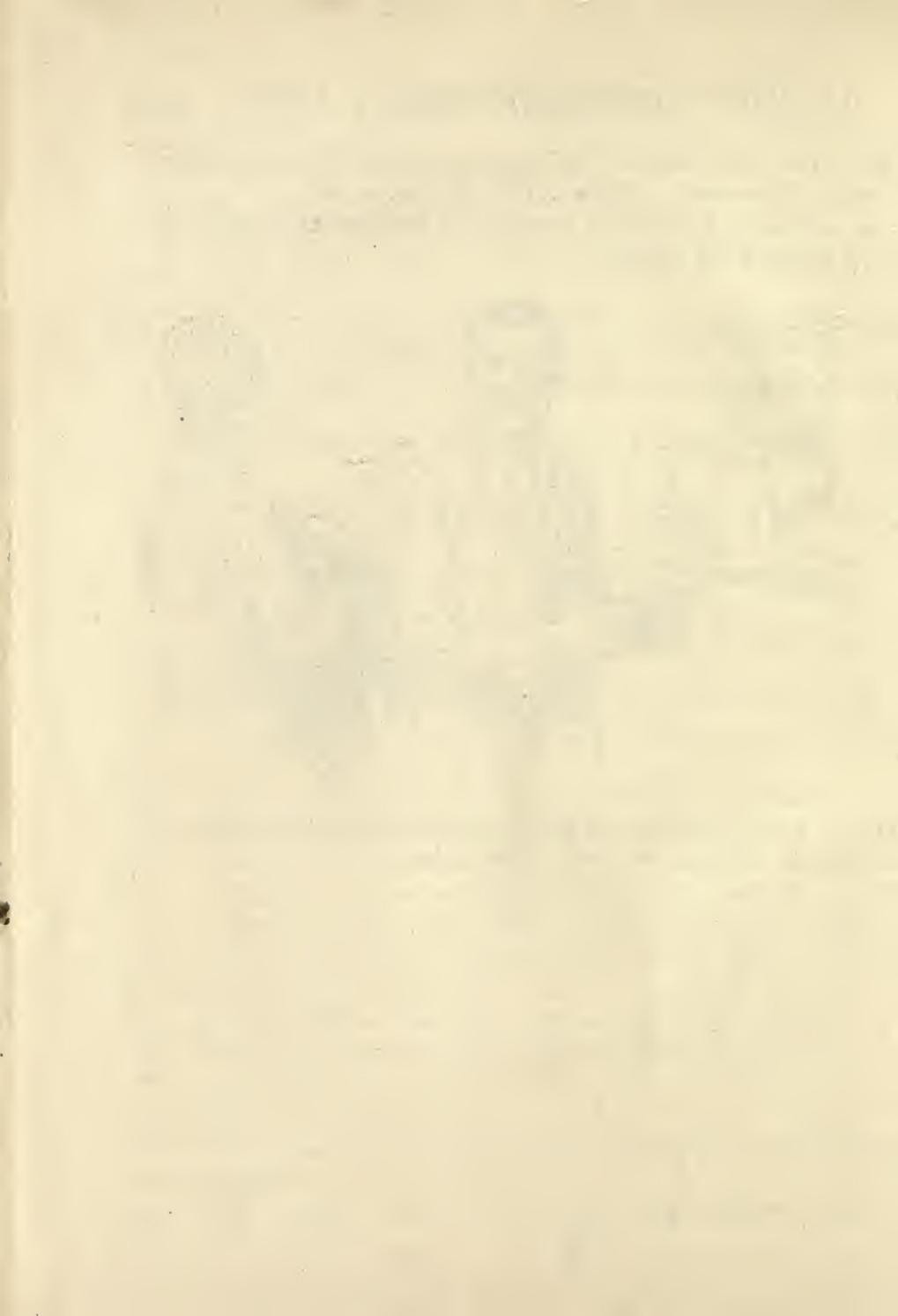
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23. What are some of the ways in which fires are started through carelessness? How can they be prevented?

24. Should one taste the contents of an unlabeled bottle to find out what it is? Why?



25. If a person does not know whether the drinking water is pure or not, what should he do before using it?



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